

FIG. 18A

ORGANIZATION :

S1	<Name>
S2	<Belongs to Higher parent Organization>
S3	<Owns Suborganization (s)>
S4	<Orgn Type>
S5	<Work Type>
S6	<Work Domain>
S7	<Address which is VENUE>
S8	<has a Nominal head>
S9	<has a Representative head>
S10	<Phone Number>
S11	<Fax Number>
S12	<number of Persons working>
...	

FIG. 18B

Example of Organization :

S1	Canon R & D Headquarters
S2	(Canon Inc)
S3	(A & B Center, C & C Center, D & D Center)
S4	Private
S5	R & D
S6	(Optice)
S7	(Tokyo, Ohta-Ku, Shimomaruko 3-30-2)
S8	Senior General Manager
S9	Senior General Manager
S10	(+81-03-3871-2111)
S11	(+81-03-3971-3701)
S12	2822
...	

FIG. 19A

KNOWLEDGE DOMAIN :	
S1	<Name>
S2	<Owns Knowledge Domain>
S3	<Belongs to Knowledge Domain>
S4	<Books>
S5	<Journals>
S6	<Leading Research of Type Univ / Orgn. >
...	

FIG. 19B

Example

S1	Natural Language Processing
S2	(Generation Parsing Understanding ...)
S3	(Artificial Intelligence, Linguistics,...)
S4	(...)
S5	(AI Magazine, Cognitive Science,...)
S6	...
...	

FIG. 20

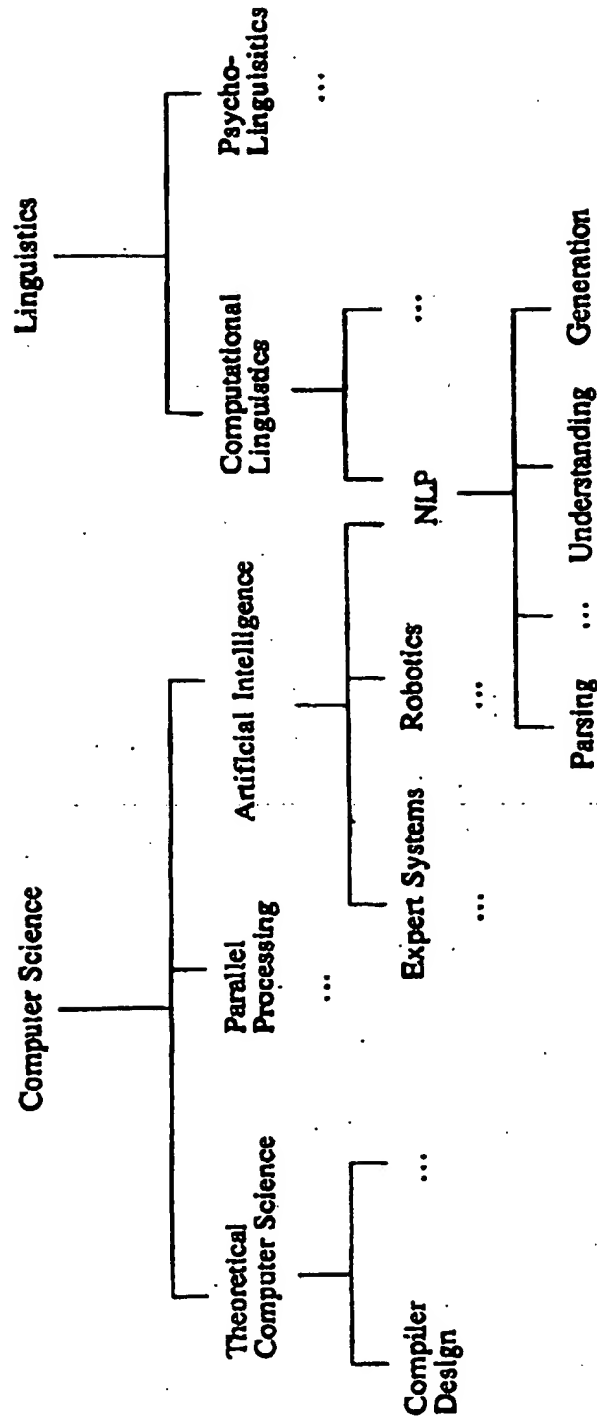


FIG. 21

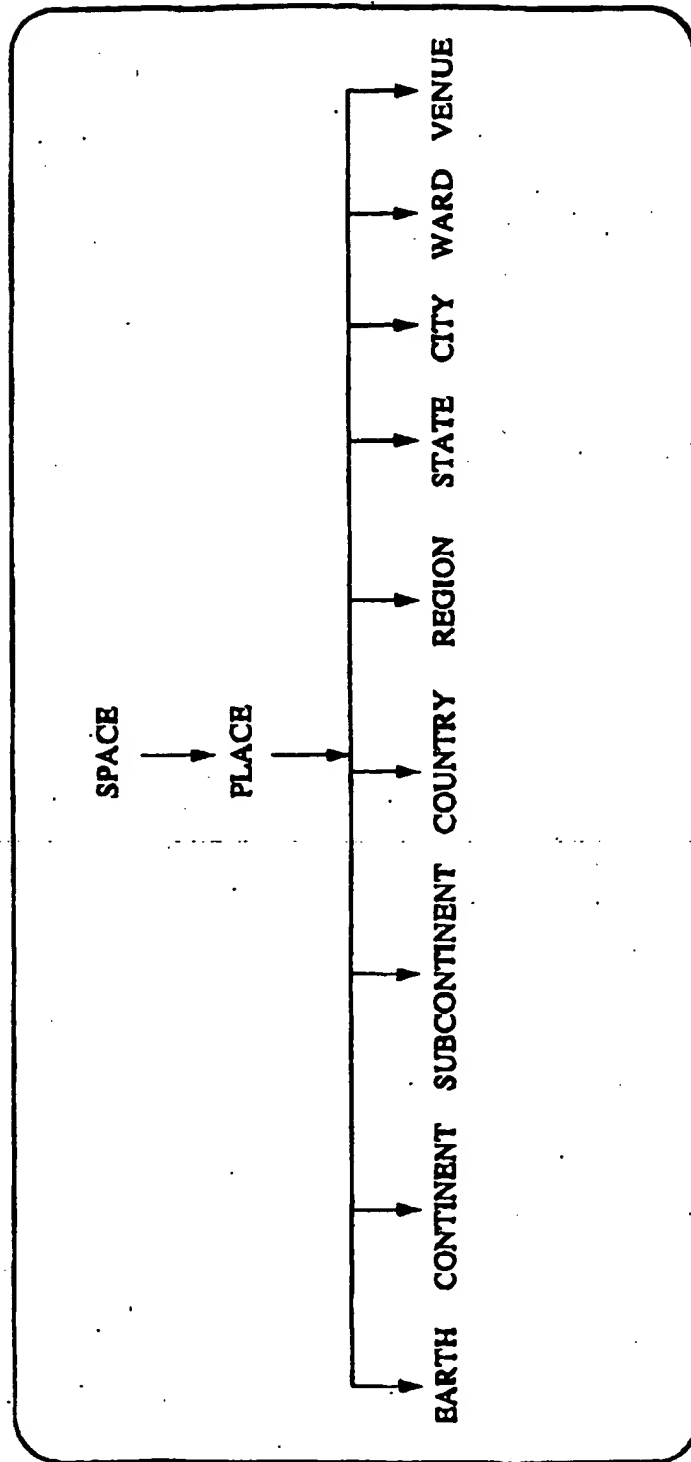


FIG. 22A

PLACE :	
S1	<Name>
S2	<Owns Places>
S3	<Belongs to Places>
S4	<has Population>
S5	<has Persons>
S6	<occupies Area>
S7	<Located at>

FIG. 22B

COUNTRY :	
S1	<Name>
S2	<State> [Owns]
S3	<Continent> [Belongs to]
S4	<hes Population>
S5	<has Persons>
S6	<occupies Area>
S7	<Located at>
S8	<Capital which is City>

FIG. 22C

Example of Country :

S1	Japan
S2	Tokyo, Osaka, Kanagawa, Hokkaido,...
S3	Asia
S4	(150 million)
S5	...
S6	...
S7	...
S8	Tokyo

## FIG. 23

### Venue

- name
- building name
- address
- city
- state
- region
- country
- subcontinent
- continent

FIG. 24

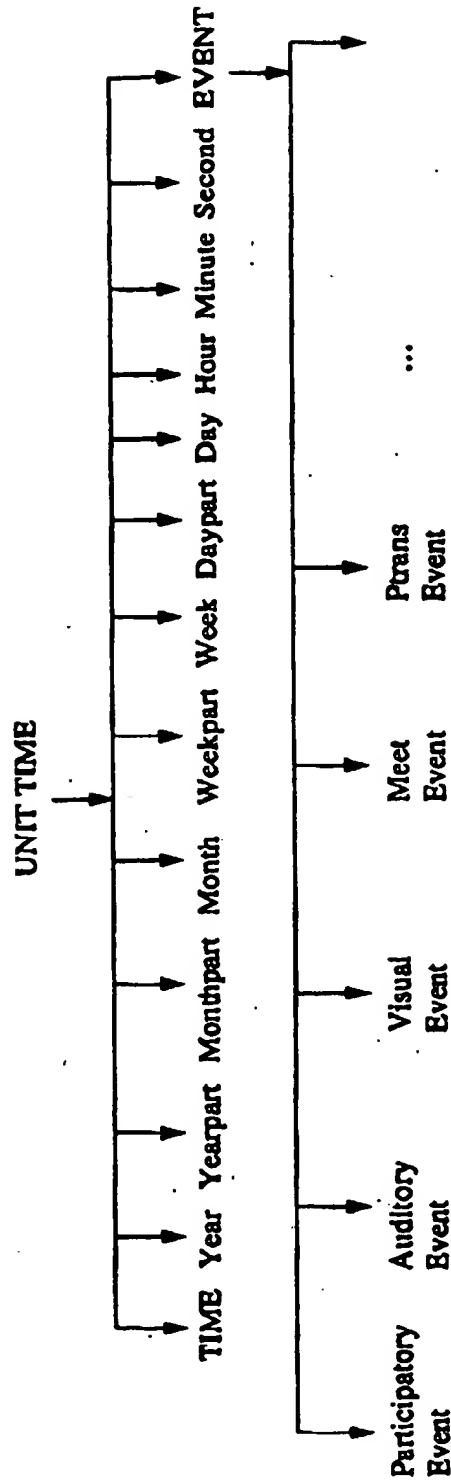


FIG. 25

UNIT TIME :

S1	<Owns Unit Time>
S2	<Belongs to Unit Time>
S3	<Count>
S4	<Qualifier>

TIME :

S1	<has Second>
S2	<has Minute>
S3	<has Hour>
S4	<has Day>
S5	<has Day part>
S6	<has Week>
S7	<has Week part>
S8	<has Month>
S9	<has Month part>
S10	<has Year>
S11	<has Year part>
S12	<has related event>



FIG. 26

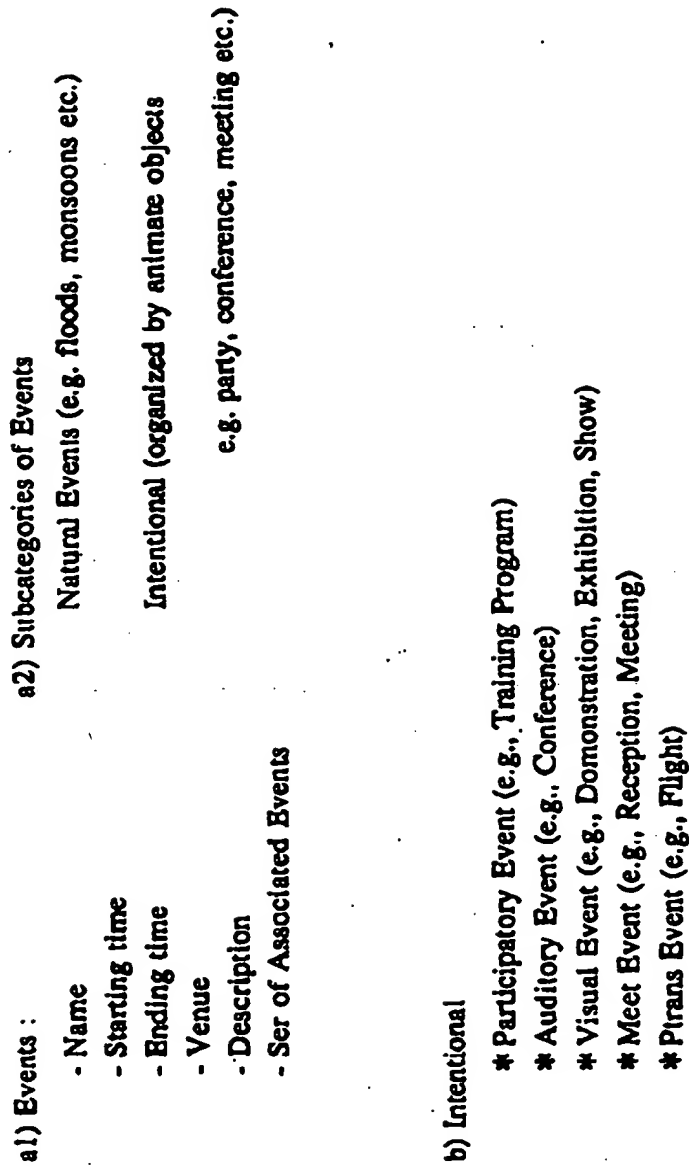


FIG. 27A

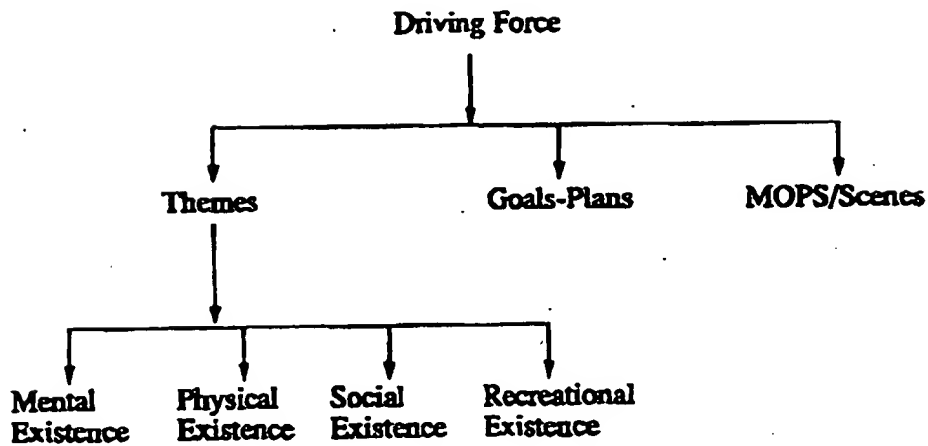


FIG. 27B

**Themes**

**Mental Existence** (e.g., Work for Existence, Get Reward)

**Physical Existence**

- Get Resource (like Money, Food) - Work

**Social Existence**

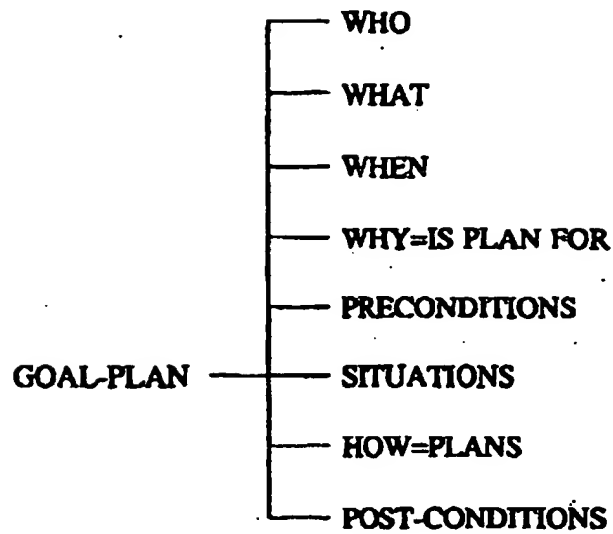
- preserve relationship

- preserve professional status

**Recreational**

- sight seeing

FIG. 28



Example :

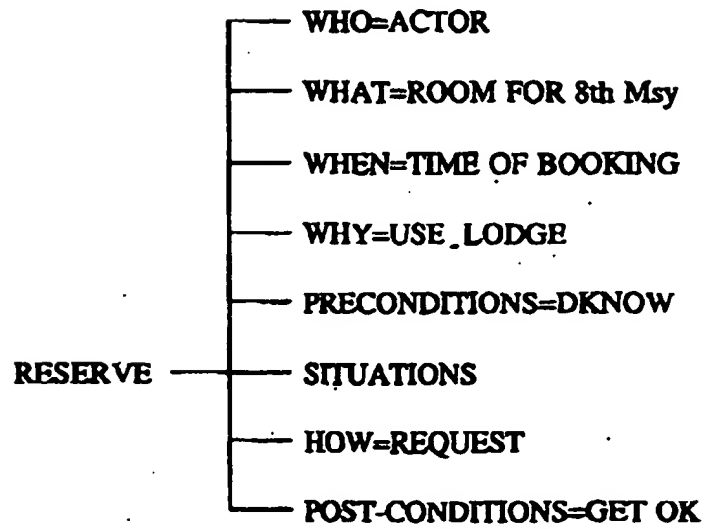
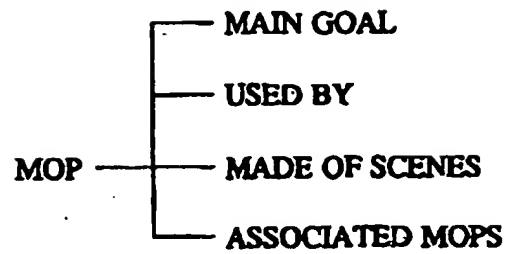


FIG. 29



Example :

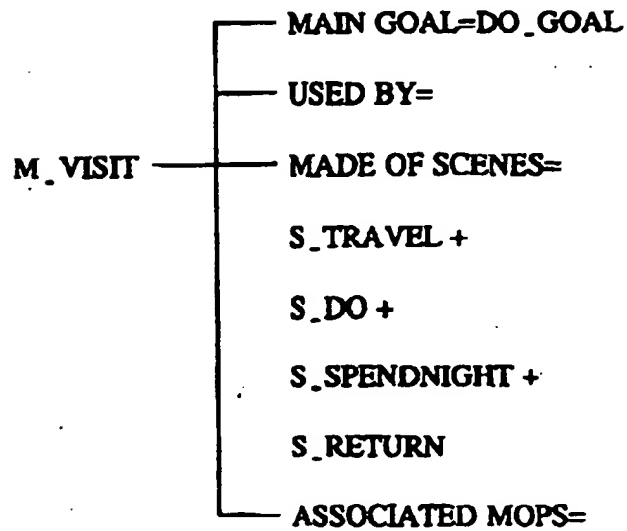
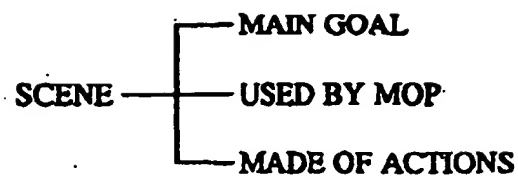


FIG. 30



Example :

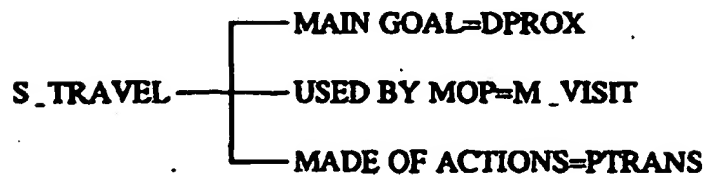


FIG. 31

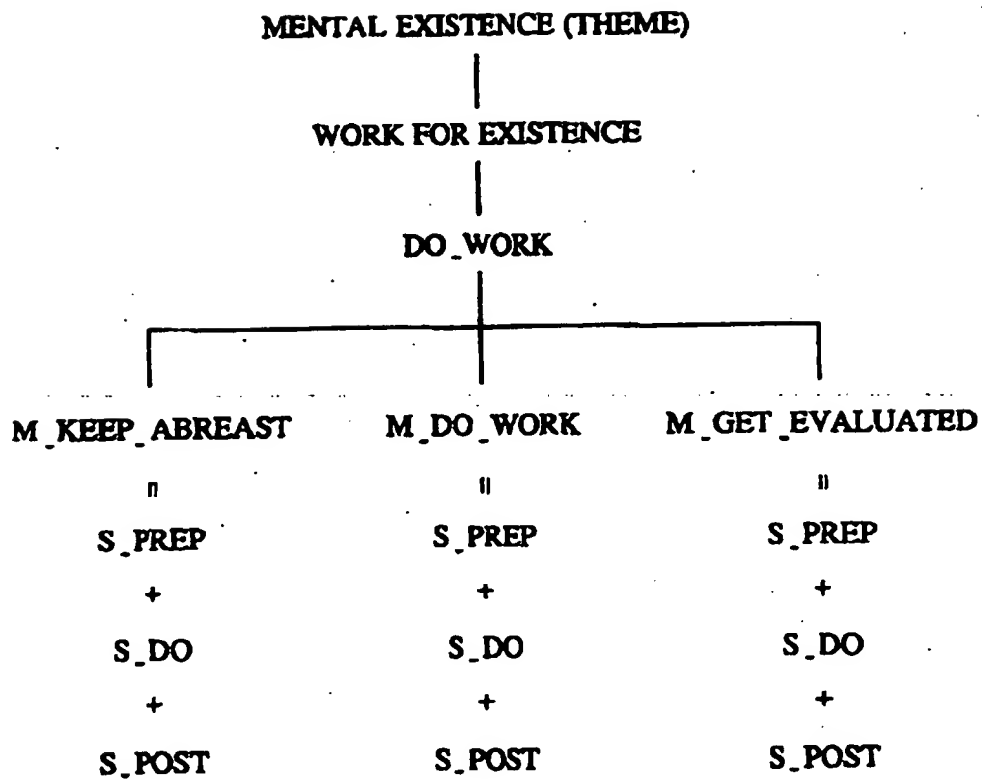


FIG. 32

E.g., Domain

R&amp;D

Sales

**M\_KEEP\_ABREAST**

<b>S_PREP</b>	decide area	decide broad area
<b>S_DO</b>	read/discuss	market survey/discuss
<b>S_POST</b>	summarize	report

**M\_DO\_WORK**

<b>S_PREP</b>	choose theory	choose product
<b>S_DO</b>	modify/experiment	sell
<b>S_POST</b>	integrate results	make profit

**M\_GET\_EVALUATED**

<b>S_PREP</b>	choose technique	choose feedback method
<b>S_DO</b>	present/publish	consumer feedback
<b>S_POST</b>	integrate feedback	improve product

FIG. 33

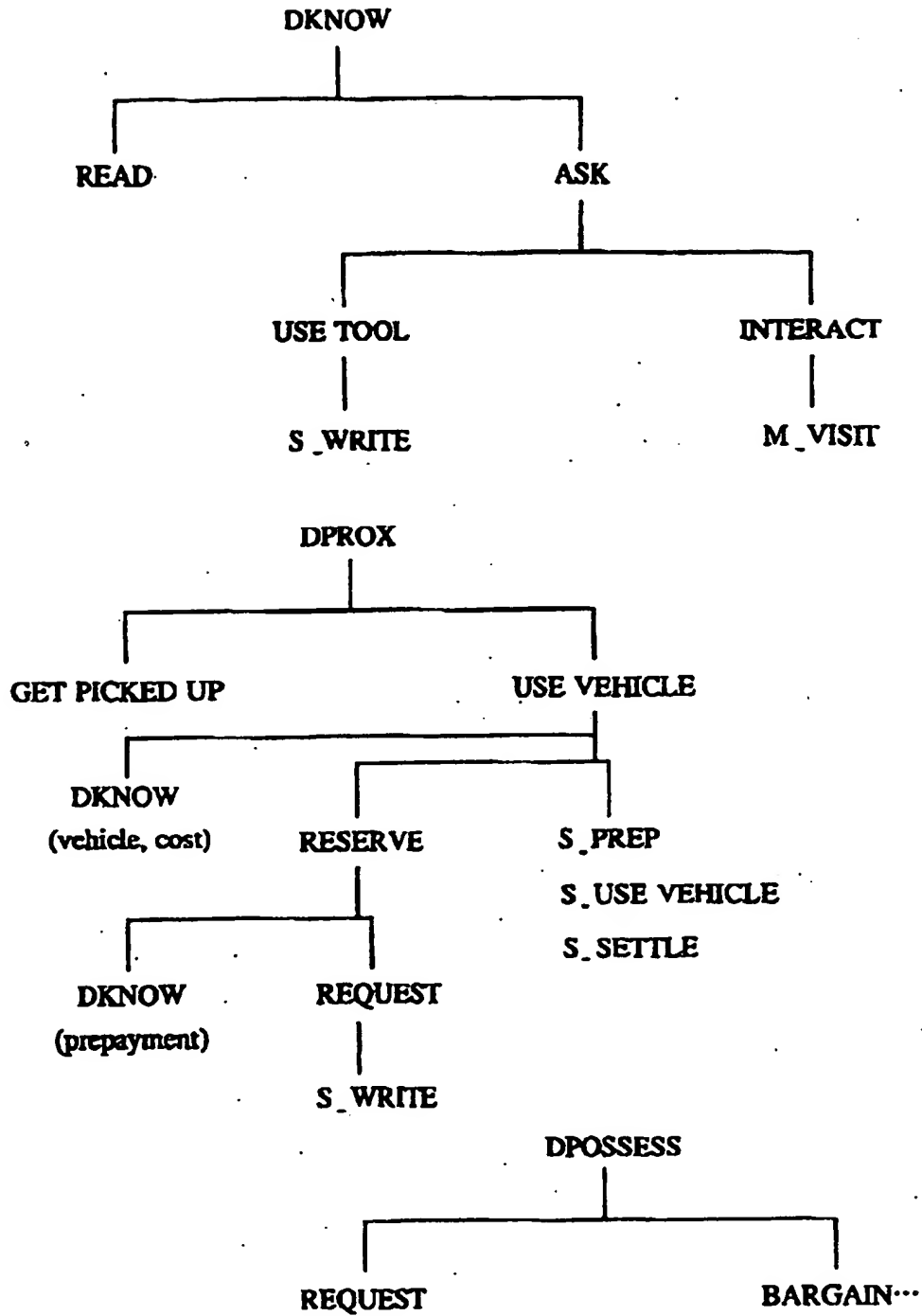




FIG. 34

ACTION / Results of Driving Forces

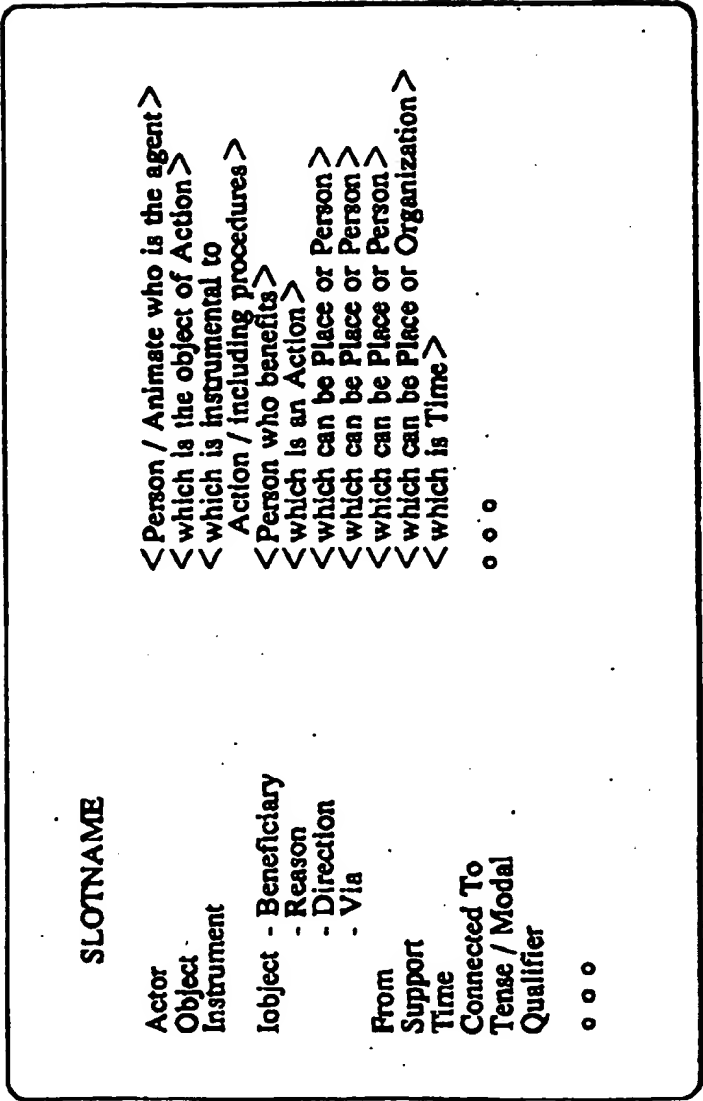


FIG. 35

<b>AGREEMENT</b>	(e.g. accept, decline, book, reserve, hire, find time, fix appointment)
<b>ARRANGE</b>	(e.g. arrange, hold)
<b>ATRANS</b>	(e.g. borrow, buy, lend, give)
<b>CONNECT-ACTION</b>	(e.g. apply, based, involve, use, imply, prove, accompany)
<b>DRIVE</b>	(e.g. drive, fly, grasp, push)
<b>FALL</b>	(e.g. blow, fall, move, rain)
<b>GROW</b>	(e.g. age, crack, dry, grow, wither)
<b>HAPPEN</b>	(e.g. happen, occur)
<b>KNEADING</b>	(e.g. kneading, crush)
<b>MACT</b>	(mental actions e.g. display, show, exhibit, demonstrate, teach, lecture, publish)
<b>MBUILD</b>	(mental buildups e.g. decide, design, figure out, note, plan, remember)
<b>MEET</b>	(e.g. meet, visit, see, receive, pick up, drop)
<b>MFEEL</b>	(feelings e.g. thank, accept, appreciate, reward, trouble, apologize, praise, feel)
<b>MPROC</b>	(mental processes e.g. think, learn, understand, remind, remember, image, wonder, visualize)
<b>MSENSE</b>	(senses e.g. see, learn, listen, hear, attend, read, enjoy, attend, perceive)
<b>MTRANS</b>	(mental transfers e.g. inform, express, extend, advise, communicate, get/give, have, convey, discuss, suggest, tell, send/receive, interact, phone, write, say, call, learn, question, query, answer, instruct, contact, verify, modify, beg, urge, congratulate, acknowledge)
<b>PACT</b>	(physical actions e.g. write, perform, check in, dance, sing)
<b>PERMIT-ACTION</b>	(e.g. allow, enable, let, try)
<b>PROBABLE-ACTION</b>	(e.g. appear, look, seem, suggest, indicate)
<b>PTRANS</b>	(physical transfers e.g. go, bring, come, forward, mail, return, send/receive, arrive, reach, return, leave, depart, deliver, dispatch, route, tour)
<b>SUBMIT</b>	(e.g. submit)
<b>TPASSAGE</b>	(e.g. wait)
<b>USE RESOURCE</b>	(e.g. stay, waste, spend)
<b>WORK</b>	(e.g. design, develop, research, study, work)

FIG. 36

MBET

SLOTNAME	
Actor	< Person / Animate who is the agent >
Object	< Person who is the object >
Instrument	
lobject - Beneficiary	< Person who benefits >
- Reason	< which is an Action >
- Direction	nil
- Via	nil
From	
Support	< which can be Place or Organization >
Time	< which is Time >
Connected To	o o o
Tense / Modal	
Qualifier	
	o o o

FIG. 37

MBET

SLOTNAME	
Actor	PERSON
Object	PERSON
Instrument	
lobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	nil
- Via	nil
From	
Support	
Time	
Connected To	
Tense / Modal	
Qualifier	
o o o	
	PLACE / ORGANIZATION
	TIME

FIG. 38

## AGREEMENT

SLOTNAME	
Actor	< Person / Animate who is the agent >
Object	< which can be Accommodation / Ticket... >
Instrument	< which is instrumental to
	Action / Communication >
Iobject - Beneficiary	< Person who benefits >
- Reason	< which is an Action >
- Direction	
- Via	< which can be Person >
From	
Support	
Time	< which is Time >
Connected To	o o o
Tense / Modal	
Qualifier	
o o o	

FIG. 39

MTRANS

SLOTNAME	
Actor	< Person / Animate who is the agent >
Object	< which can be Action or Object >
Instrument	< which is Instrumental to Action / including procedures >
Object - Beneficiary	< Person who benefits >
- Reason	< which is an Action >
- Direction	< which can be Place or Person >
- Via	< which can be Place or Person >
From	< which can be Place or Person >
Support	< which can be Place or Organization >
Time	< which is Time >
Connected To	o o o
Tense / Modal	
Qualifier	
	o o o

FIG. 40

PTRANS

SLOTNAME	
Actor	< Person / Animate who is the agent >
Object	< which is instrumental to
Instrument	Action / including procedures >
Object - Beneficiary	< Person who benefits >
- Reason	< which is an Action >
- Direction	< which can be Place or Person >
- Via	< which can be Place or Person >
From	< which can be Place or Person >
Support	< which can be Place or Organization >
Time	< which is Time >
Connected To	
Tense / Modal	
Qualifier	
	o o o

FIG. 41

## PTRANS

SLOTNAME	
Actor	PERSON
Object	
Instrument	ACTION / VEHICLE
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	PERSON / PLACE
- Via	PERSON / PLACE
From	PERSON / PLACE
Support	PLACE / ORGANIZATION
Time	TIME
Connected To	
Tense / Modal	
Qualifier	
o o o	

## PTRANS

SLOTNAME	
Actor	PERSON
Object	
Instrument	ACTION / VEHICLE
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	Vicinity of Listener's Location
- Via	PERSON / PLACE
From	PERSON / PLACE
Support	PLACE / ORGANIZATION
Time	TIME
Connected To	
Tense / Modal	
Qualifier	
o o o	

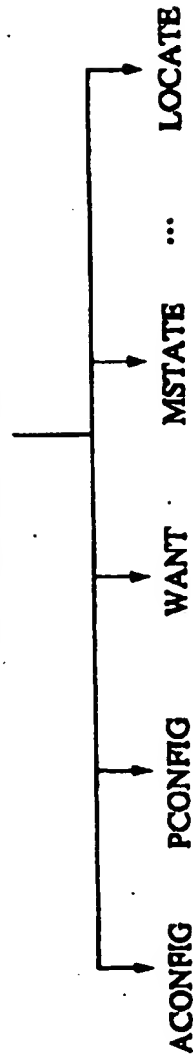


FIG. 42

FORCE	DRIVEN OBJ	CHANGE	ACTION
Natural	Phy. obj.	Spetial	FALL (e.g., fall, move, rain, blow)
Natural	Phy. obj.	Temporal	GROW (e.g., dry, grow, age, wither, crack)
Natural	Human	State of Human	HAPPEN (e.g. happen, occur)
Natural	Nil	State of time	TPASSAGE (pass time)
Int. pay.	Phy. obj.	State of Resource (money, energy)	TPASSAGE (spend)
Int. mech.	Phy. obj.	Spatial	DRIVE (push, drive, fly, graep)
Int. mech.	Phy. obj.	Temporal	KNEADING
Int. pay.	Animate	Spatial	PTRANS (go, come)
Int. pay.	Animate	State of Obj/ Associated abs. entity	MSENSE
Int. pay.	Human	State of Associated abs. entity	MPROC, MBUILD MACT, MFEEL,
Int. pay.	Human, Phy. obj.	State of Phy. obj.	PACT (perform)
Int. pay.	Human-1, Human-2.	State of human-2.	MTRNS, AGREEMENT

FIG. 43

State Descriptors / results of Actions



ACONFIG (e.g., Entitle, like, own, prefer, to be, have, propose, involve)  
 ESCHEDULE (e.g., arrange, organize, plan, schedule, take place, postpone)  
 LOCATE (e.g., find, locate, search, look for, dislocate)  
 MSTATE (e.g., agree, anticipate, believe, foresee, know, learn, please, trust, to be, understand, interest, remember, specify)  
 PCONFIG (e.g., enclose, to be, attach, accommodate, include)  
 WANT (e.g., anticipate, expect, hope, like, want, wish, need require, prefer)

FIG. 44

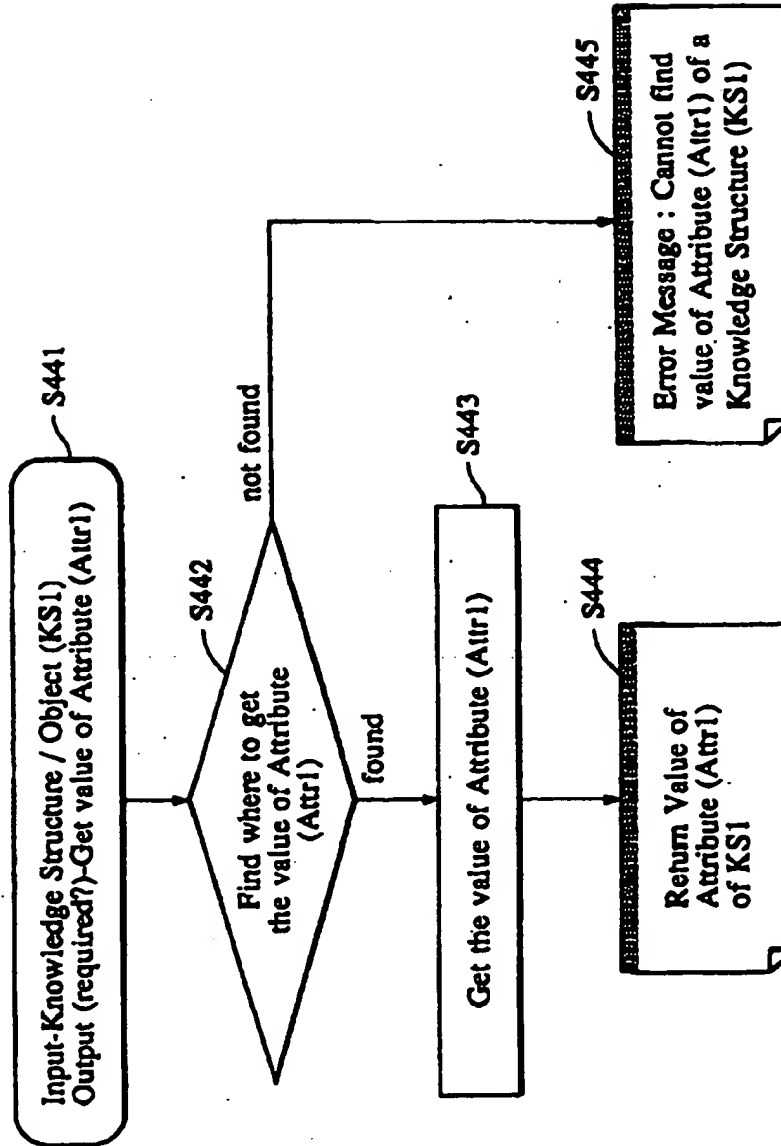


FIG. 45

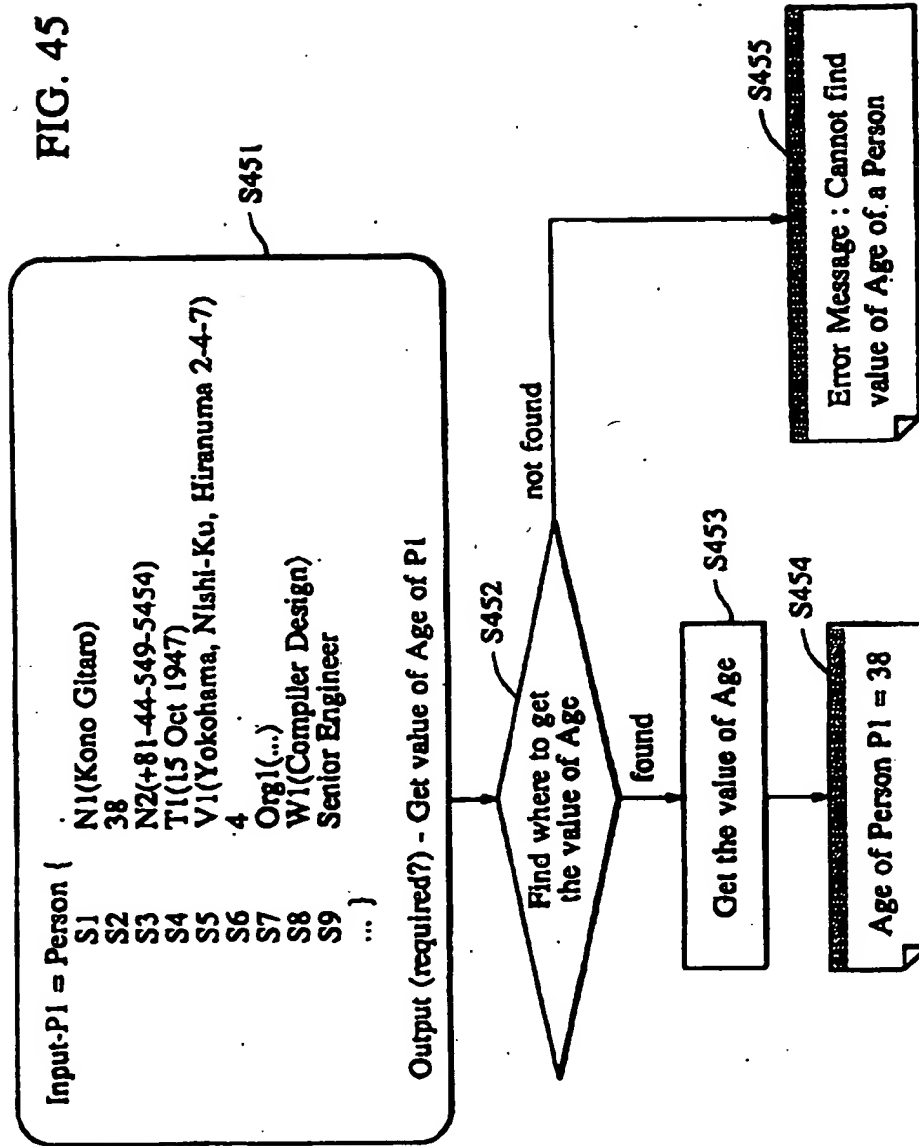


FIG. 46

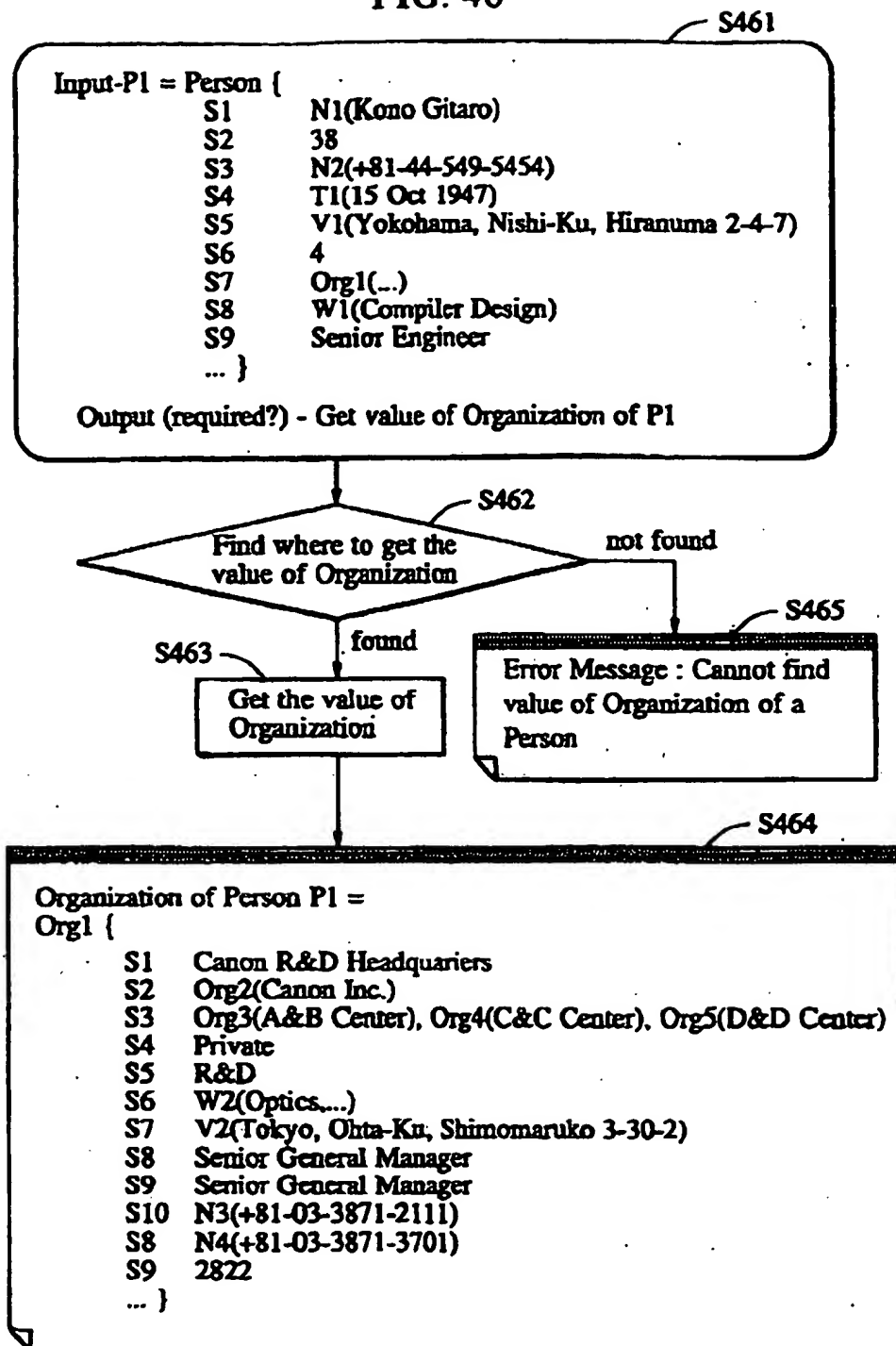


FIG. 47

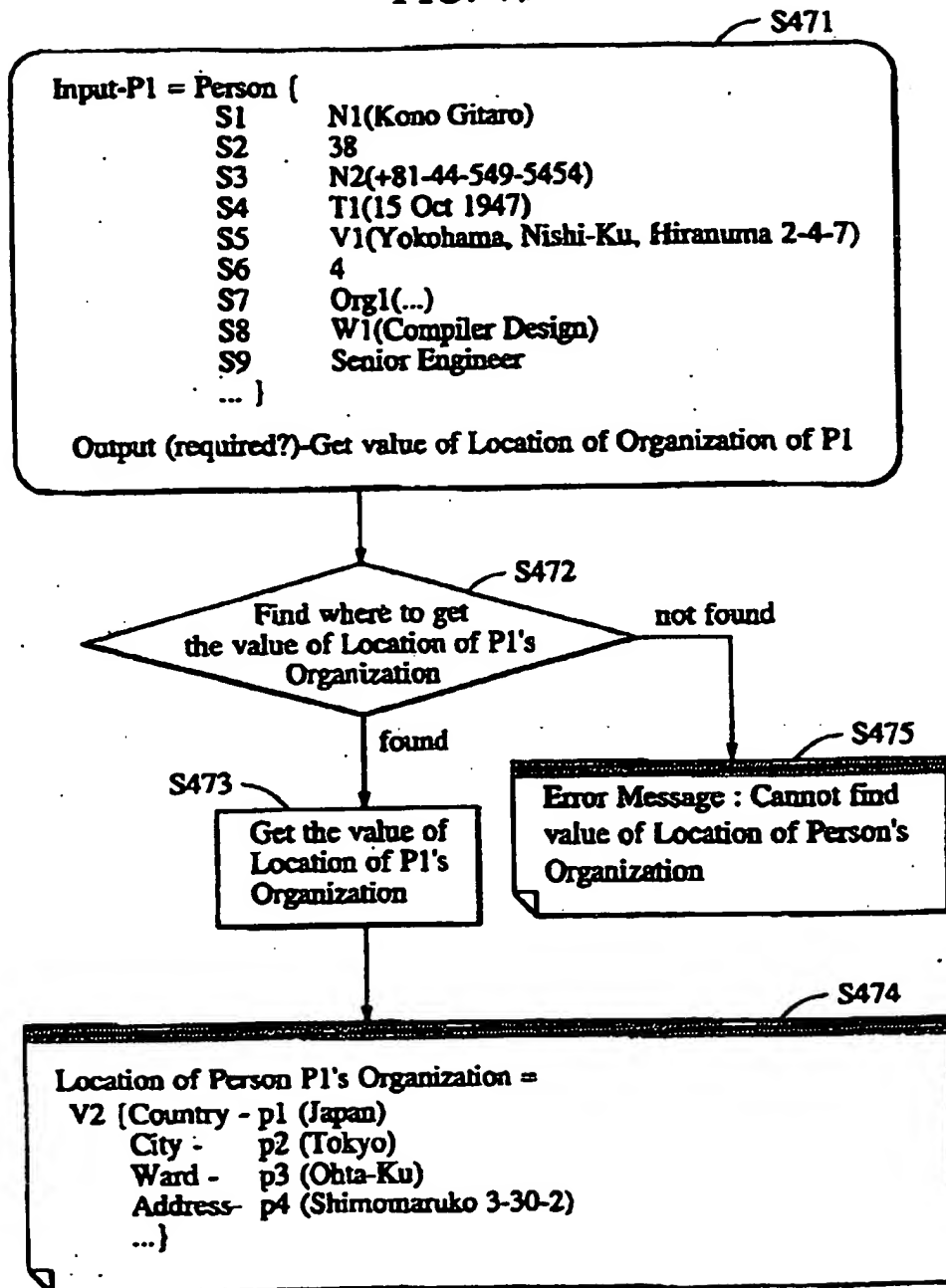


FIG. 48

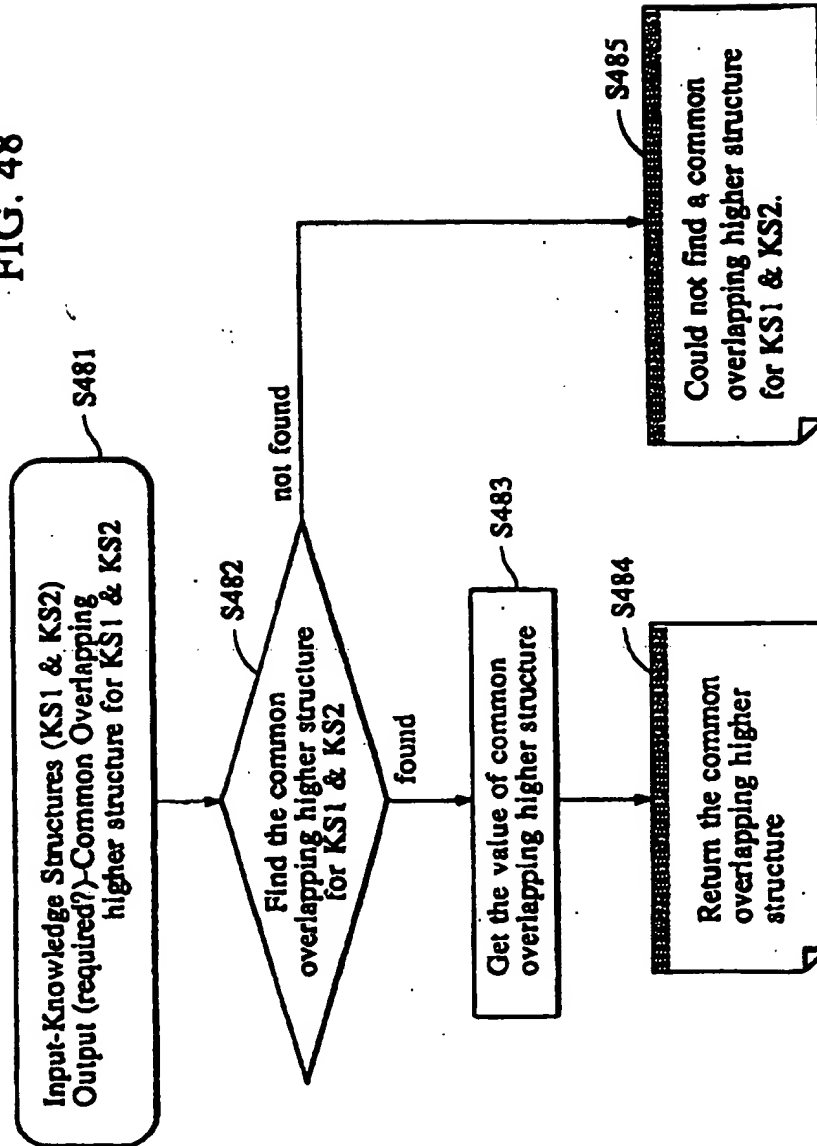


FIG. 49

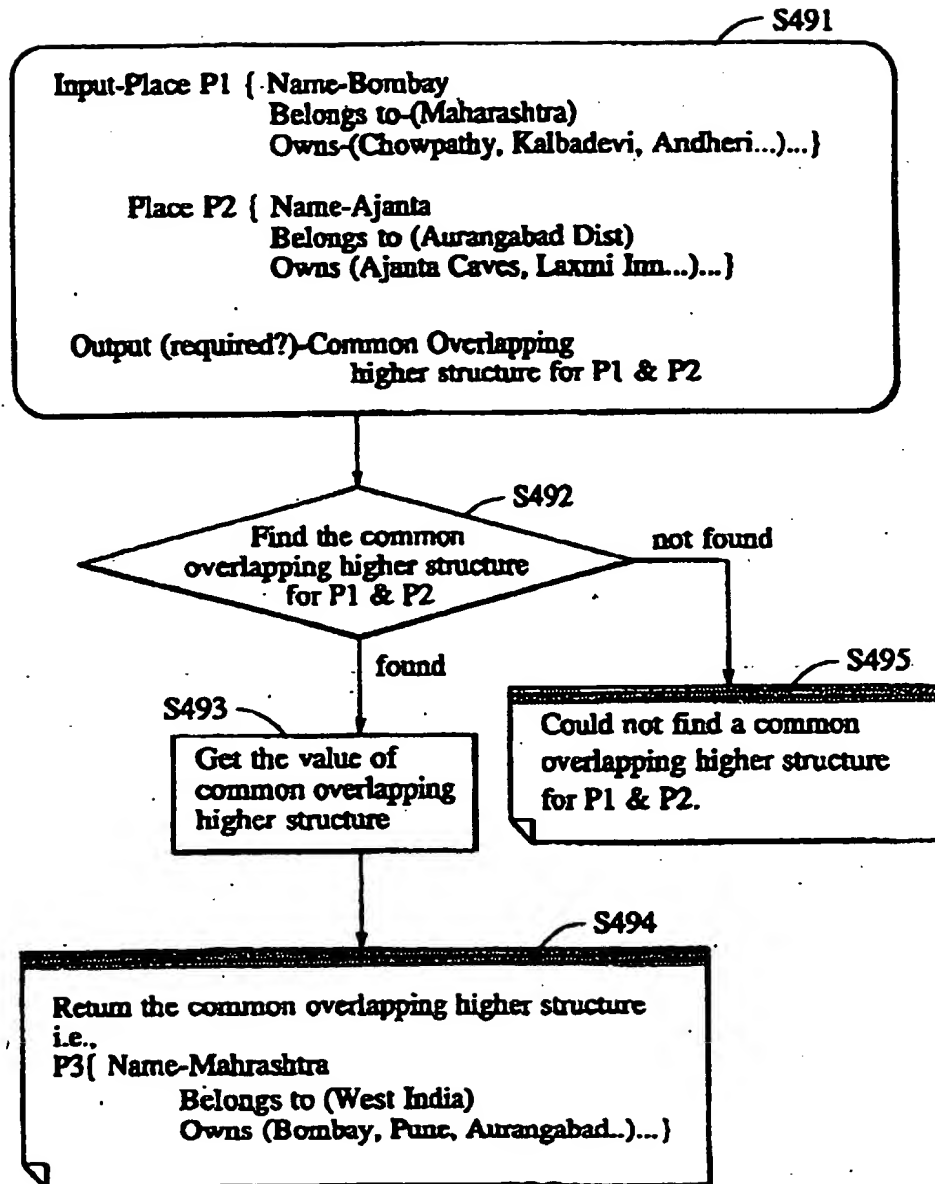
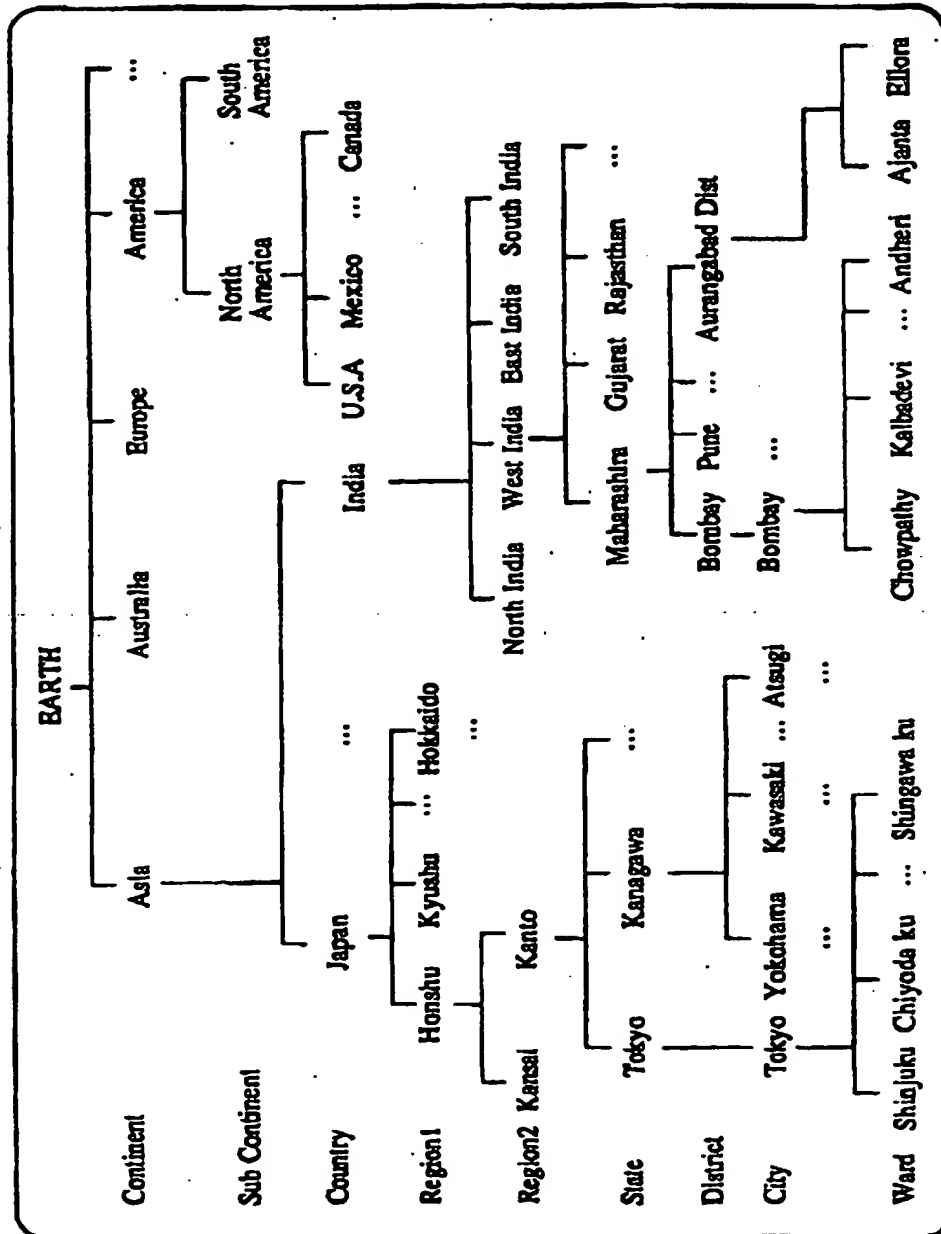




FIG. 50A



**FIG. 50B**

(a) Q : Is Ajanta near Bombay ?

A : Yes, they are in the same state - Maharashtra. It takes about 45min by flight...

(b) Q : Is Ajanta in West India ?

A : Yes, it is in state - Maharashtra. It 45 minutes flight from Bombay...

(c) Q : Is Shinjuku in Japan ?

A : Yes

(d) Q : Where is Shinjuku ?

A : It is a Ward in Tokyo Metropolitan, in Japan.

(e) Q : Is Shinjuku a City in Japan ?

A : No, It is a Ward in Tokyo.

FIG. 51

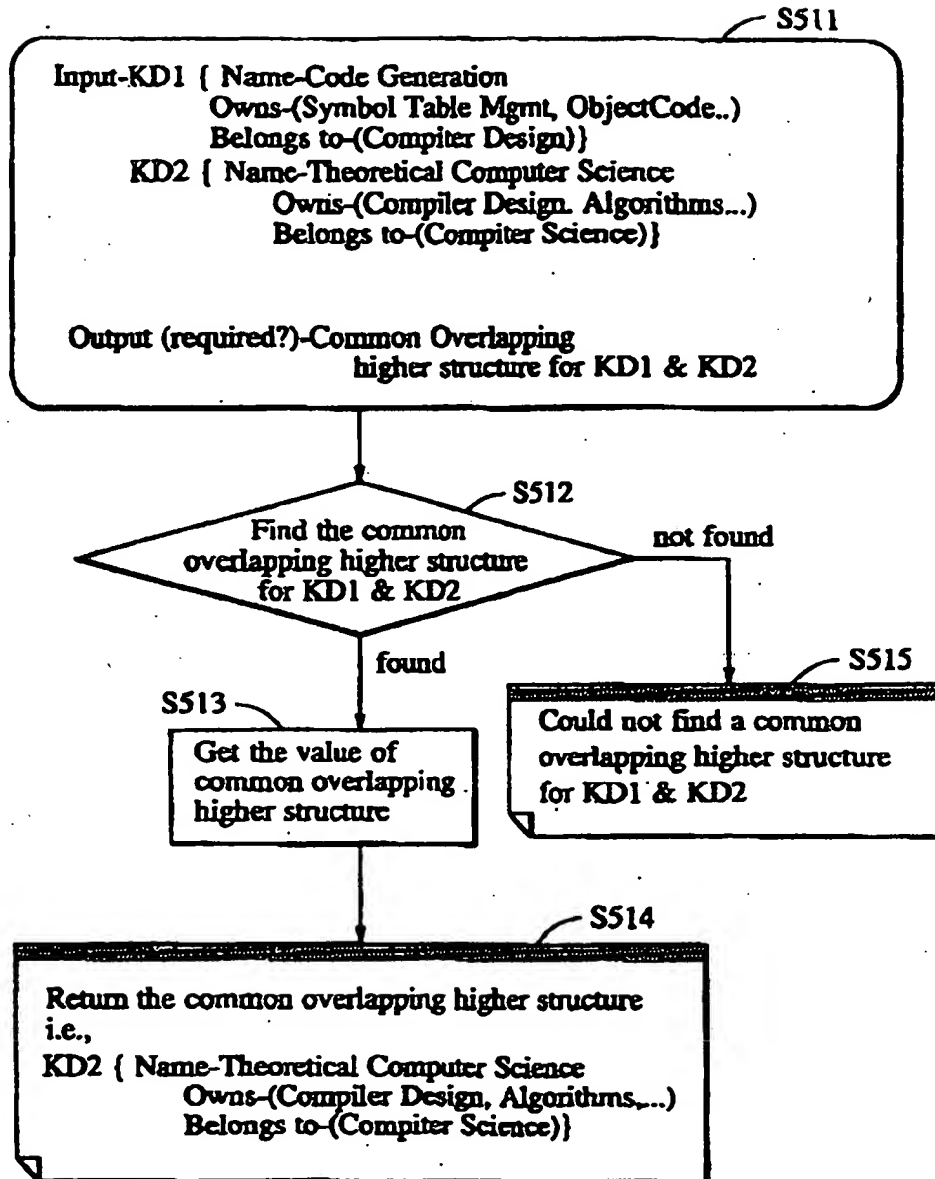
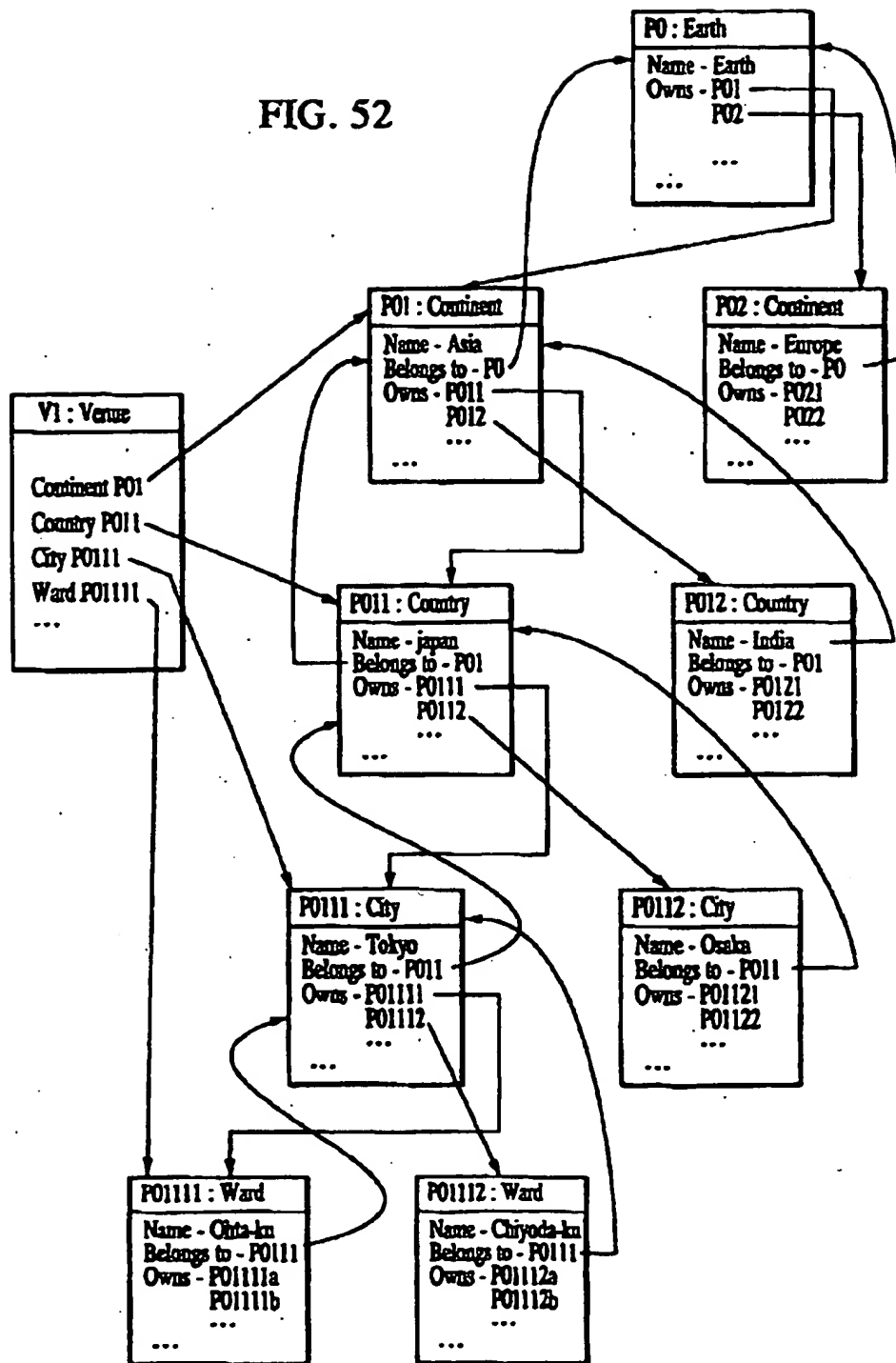


FIG. 52



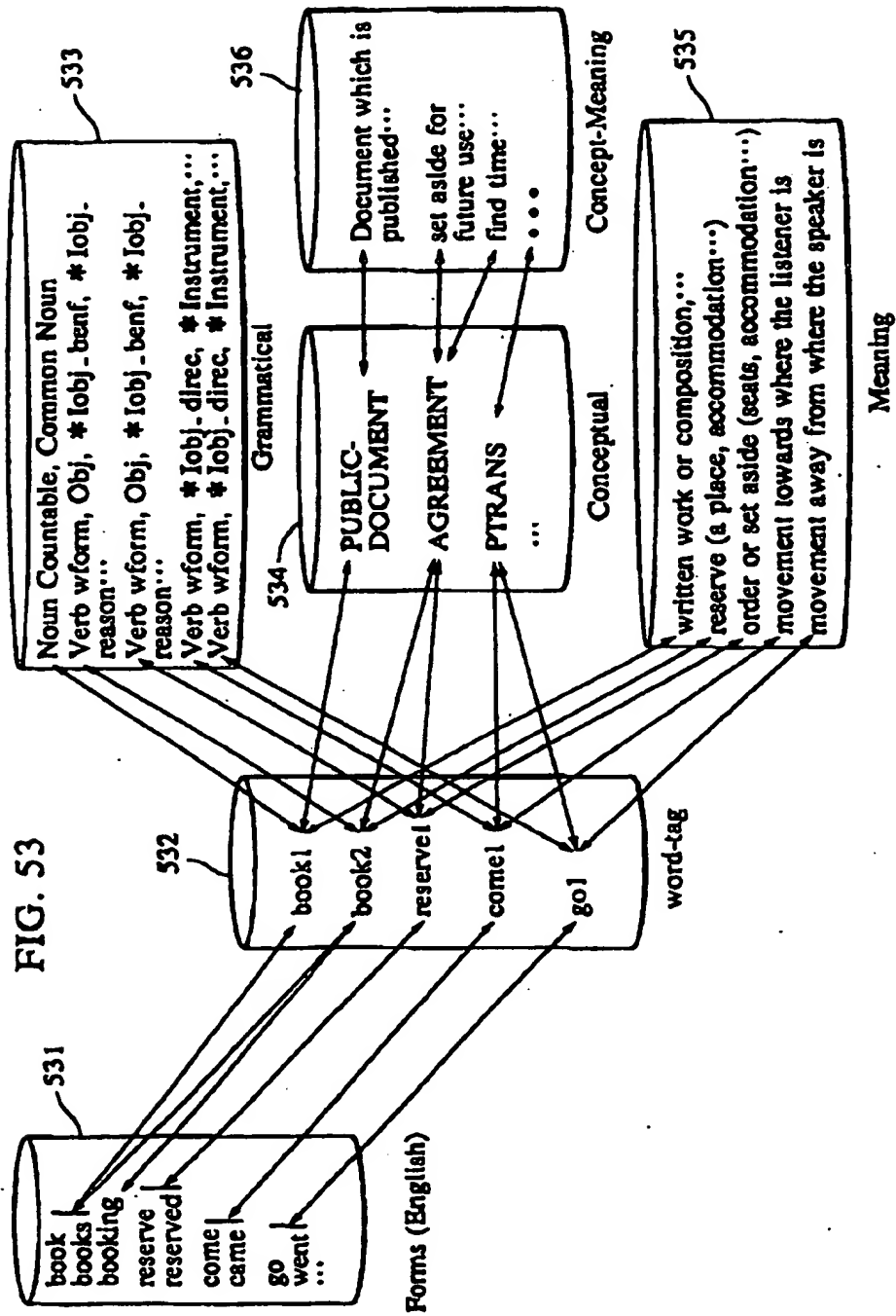


FIG. 54

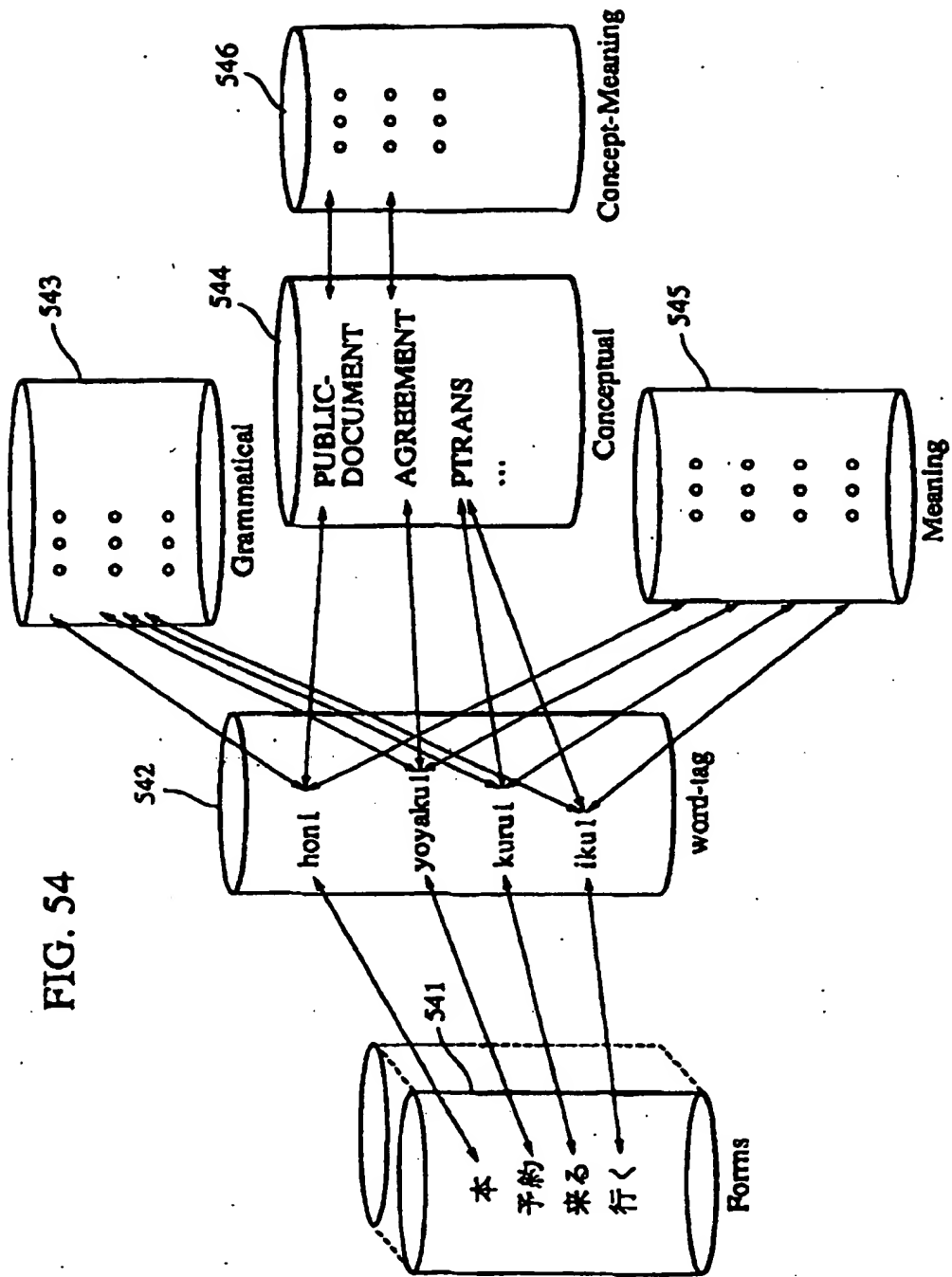


FIG. 55A

Word	Word-tag	Form (other properties)
come	come1	BASEFORM
comes	come1	PRESTFORM
coming	come1	PROGFORM
came	come1	PASTFORM
go	go1	BASEFORM
goes	go1	PRESTFORM
going	go1	PROGFORM
went	go1	PASTFORM
gone	go1	PARTFORM
book	book2	BASEFORM
books	book2	PRESTFORM
booking	book2	PROGFORM
booked	book2	PASTFORM
sent	send1	BASEFORM
send	send1	PASTFORM
get	get1	BASEFORM
got	get1	PASTFORM
get	get2	BASEFORM
got	get2	PASTFORM
get	get3	BASEFORM
got	get3	PASTFORM
reserve	reserve1	BASEFORM
reserved	reserve2	PASTFORM
work	work1	BASEFORM
accept	accept1	BASEFORM
agree	agree1	BASEFORM
decline	decline1	BASEFORM
discuss	discuss1	BASEFORM
inform	inform1	BASEFORM
travel	travell	BASEFORM
travelling	travell	PROGFORM-British
traveling	travell	PROGFORM-US
analyse	analyse1	BASEFORM-British
analyze	analyse1	BASEFORM-US
meet	meet1	BASEFORM
visit	visit1	BASEFORM
visit	visit2	BASEFORM
...	...	...

FIG. 55B

FIG. 55

FIG. 55A

FIG. 55B

book	book1	SINGULAR
books	book1	PLURAL
pen	pen1	SINGULAR
pens	pen1	PLURAL
pencil	pencil1	SINGULAR
pencils	pencil1	PLURAL
letter	letter1	SINGULAR
letters	letter1	PLURAL
...	...	...
some	some1	
every	every1	
...	...	...
i	i1	SUBJECTIVE
me	i1	OBJECTIVE
my	i1	POSS_REL
mine	i1	POSS_OBJ_REL
you	you1	OBJECTIVE, SECOND
...	...	PERSON



FIG. 56

e.g. go      BASEFORM  
       went     PASTFORM  
       gone     PARTFORM  
       \*goes    PRESENTFORM  
       \*going   PROGFORM

[\* - Forms generated by rules

Example rules are :

a) if (BASEFORM ends in 'e' but not 'ee') then

      BASEFORM - 'e' + 'ing' = PROGFORM

      else BASEFORM + 'ing' = PROGFORM

b) if (BASEFORM ends in 'o' or 's' etc.)

      then BASEFORM + 'es' = PRESENTFORM

      else BASEFORM + 's' = PRESENTFORM

(where to put this, what about nouns etc. .... → separate rule base ? )

]

76

FIG. 58

word-tag	Concept & Conditions
comel	PTTRANS (Object-Null, lobj_direct-Vicinity of Listener's location, Instrument-Vehicle) (or)
	PTTRANS (Object-Null, lobj_direct-Vicinity of Listener's location, Instrument-Vehicle)
gol	PTTRANS (Object-Null, lobj_direct-Place, From-Place, Instrument-Vehicle)
sendl	PTTRANS (Object-Movable, lobj_benef-Person, lobj_via-Person, Instrument l = Actor, lobj_direct Event or Building, Instrument-Vehicle or Person or Action)
gel	PTTRANS (Object-MovablePhysicalObject, lobj_benef-Actor, Instrument-Post, from l = Actor)
gel2	ATTRANS (Object-MovablePhysicalObject, lobj_benef-Actor, Instrument-Post, from l = Actor)
gel3	YTRANS (Object-MirroredNoun or MbuildNoun or MbuildNounform or Mised or Action, lobj_benef-Actor, Instrument-communication, from l = Actor)
book2	ACREEMENT (Object-Ticket or Building or Accommodation, Instrument-Action or communication)
reserve1	ACREEMENT (Object-Action or Offer, Mode+ve...)
accept1	ACREEMENT (Object-Action, rel-agreement)
decline1	ACREEMENT (Object-Action or Offer, Mode+ve...)
inform1	YTRANS (Object-MirroredNoun or MbuildNoun or MbuildNounform or Mised or Action, lobj_benef-Person, Instrument-communication, from-Person, Actor-Physical Object, Support-Living Building)
discuss1	YTRANS (Object-MirroredNoun or MbuildNoun or MbuildNounform or Mised or Action, lobj_benef-Person, Instrument-communication, from-Person, Actor-Physical Object, Support-Living Building)
work1	WORK (Object-Work, domain or Project, ...)
attend1	YSENSE (Object-Event, ...)
meet1	MEET (Object-Person, lobj_benef-Person, ...)
visit1	MEET (Object-Person, ...)
visit2	YSENSE (Object-Building, ...)
accommodate1	PCONFIG (Obj-Person, Actor-Physical Object, Support-Living Building)
book1	PUBLIC-DOCUMENT (Published-Yes, Periodicity = nil...)
newspaper1	PUBLIC-DOCUMENT (Published-Yes, Periodicity = Daily, ...)
pen1	WRITING-TOOL (Contains-ink, ...)
pencil1	WRITING-TOOL (Contains-Graphics, ...)
letter1	PRIVATE-DOCUMENT (From-Person/Organization, Addressed to-Person/Organization, Written on-paper, ...)
...	...

FIG. 59

book1 - written work or composition, ...  
book2 - reserve (a place, accommodation ...)  
reserve1 - order or set aside (seats, accommodation ...)  
come1 - movement towards where the listener is  
go1 - movement away from where the speaker is  
pencil1 - instrument for writing, drawing on paper  
pen1 - instrument for writing with ink on paper  
...

FIG. 60

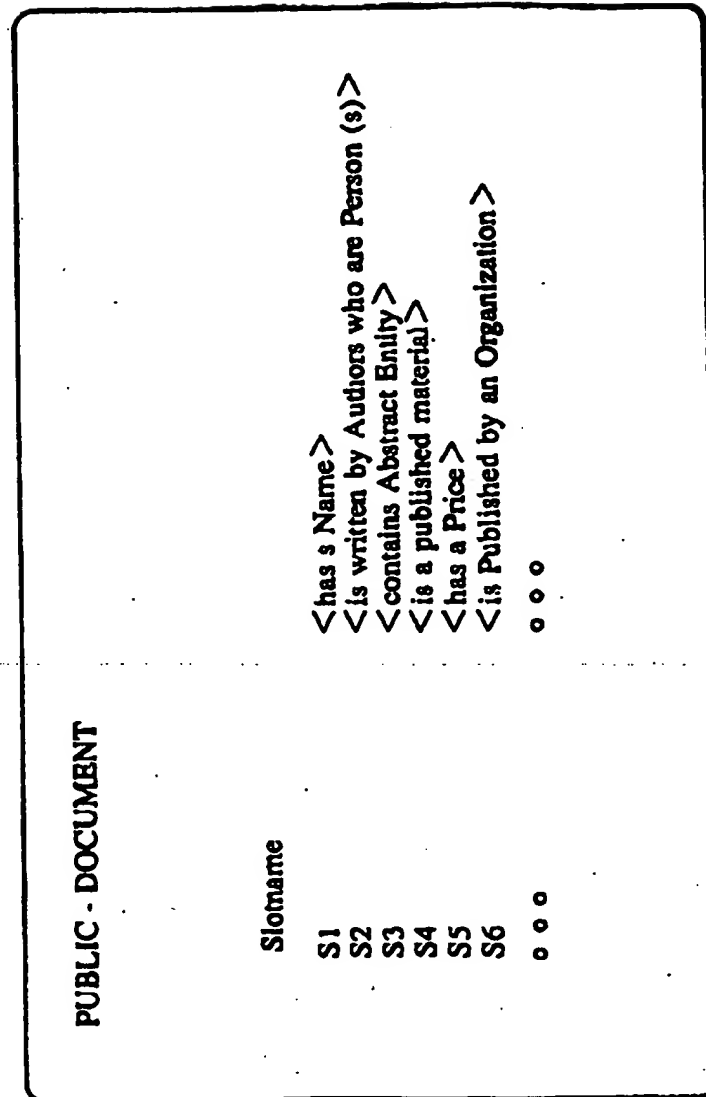


FIG. 61

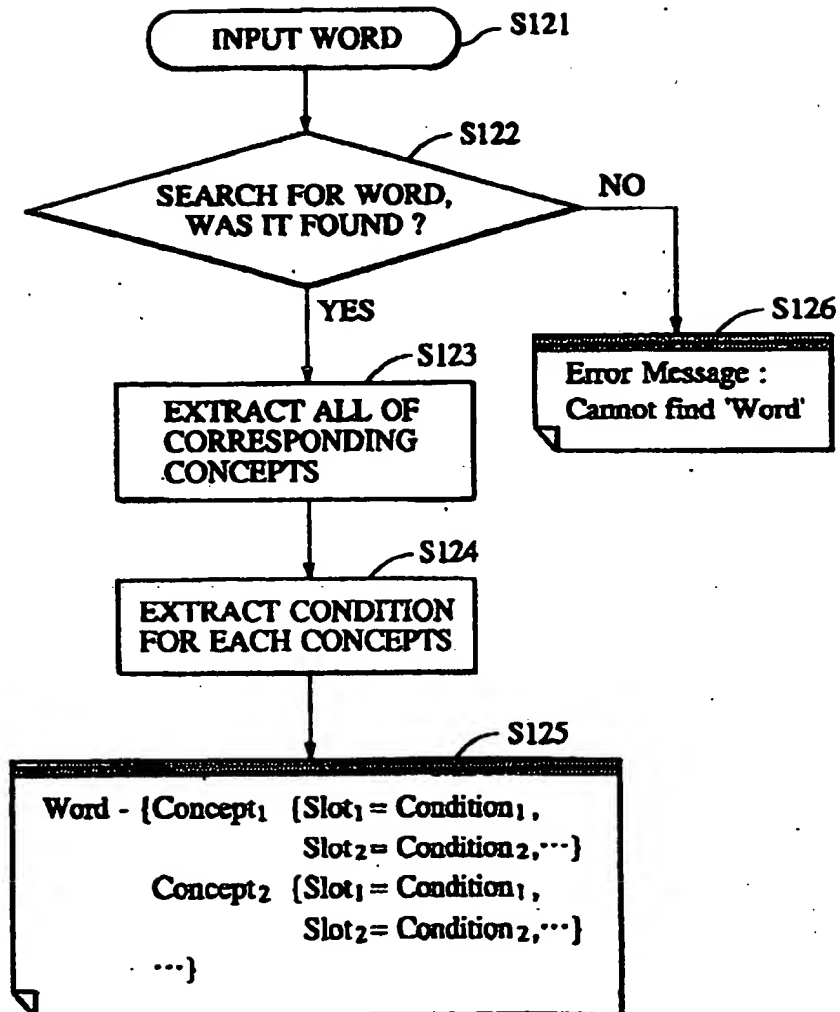
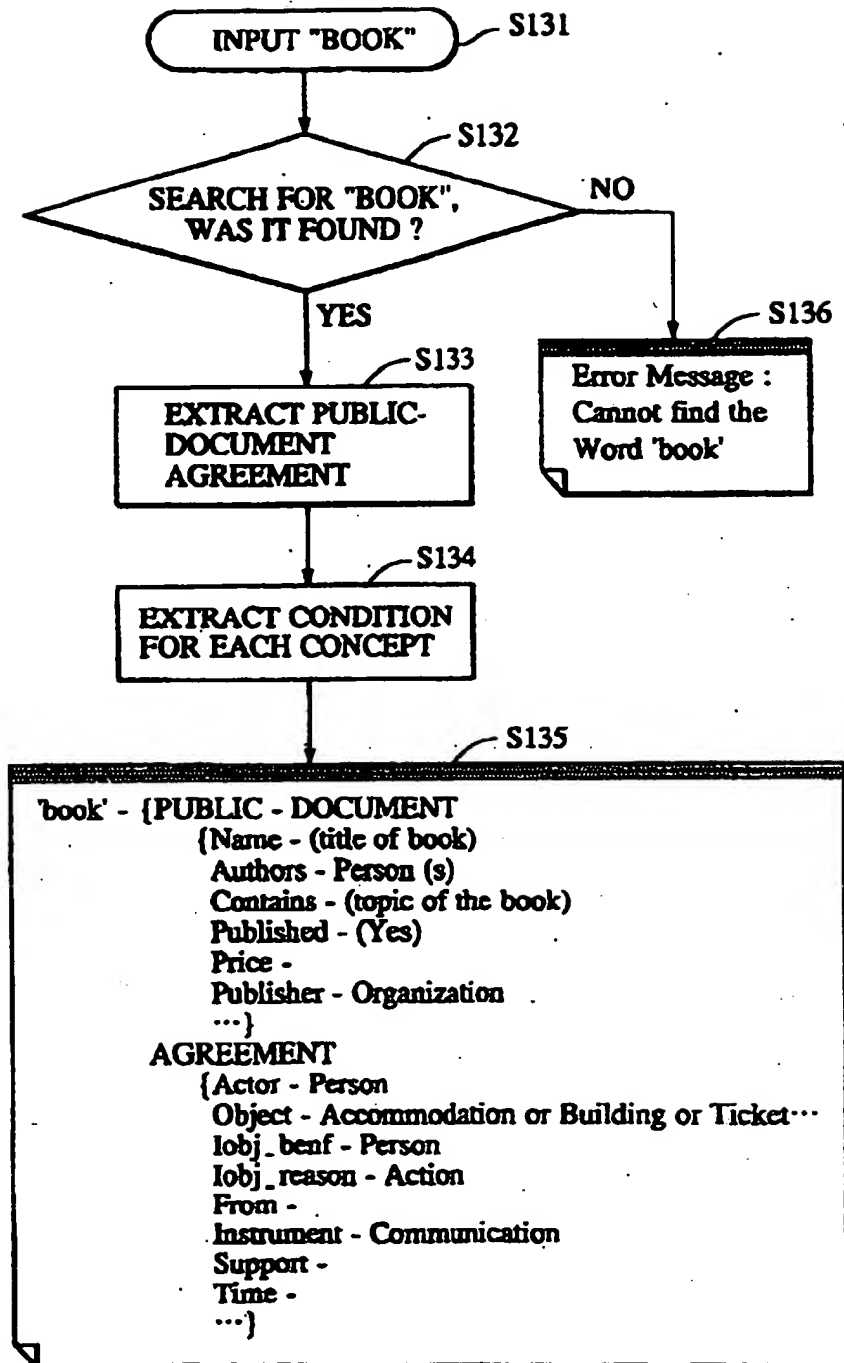


FIG. 62



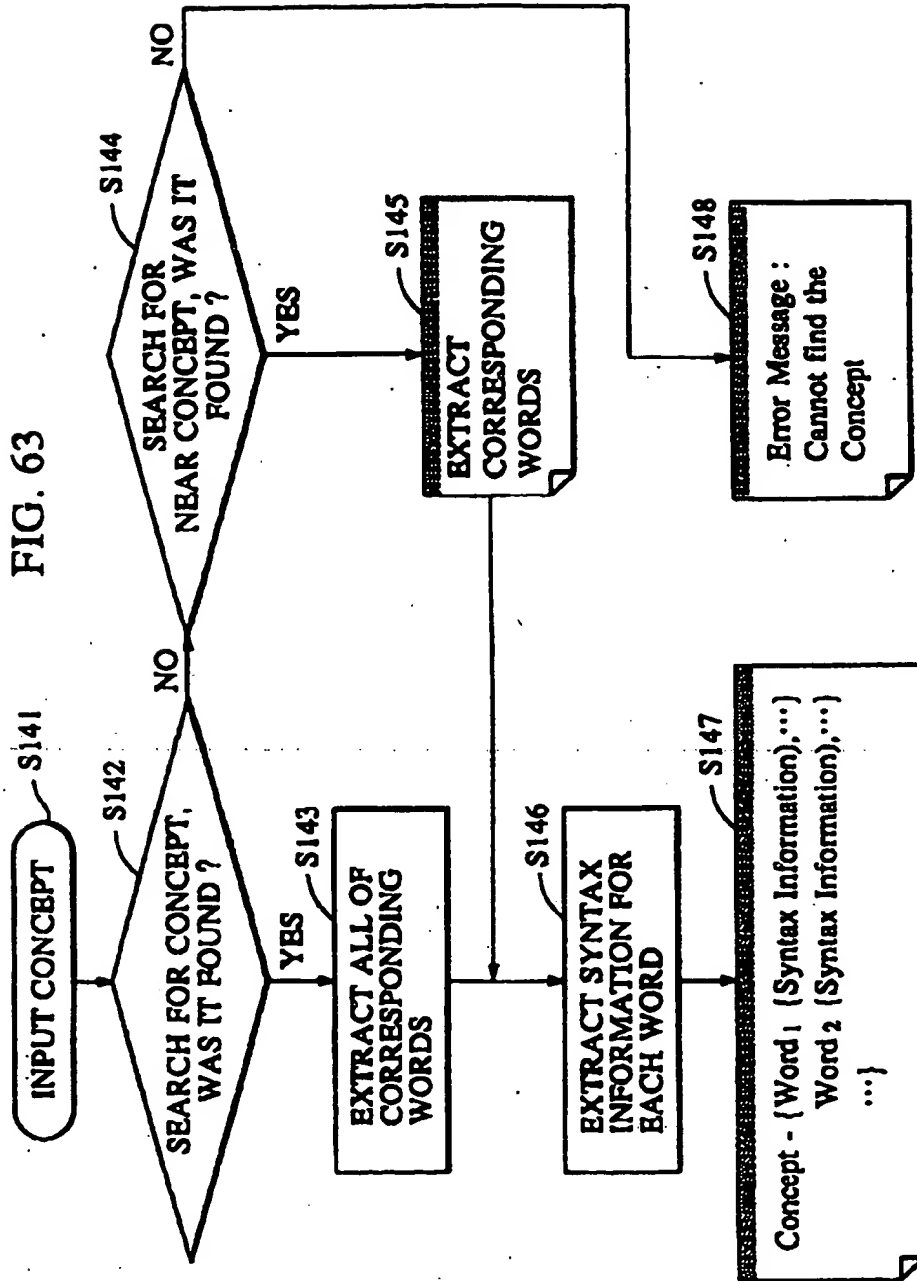




FIG. 64

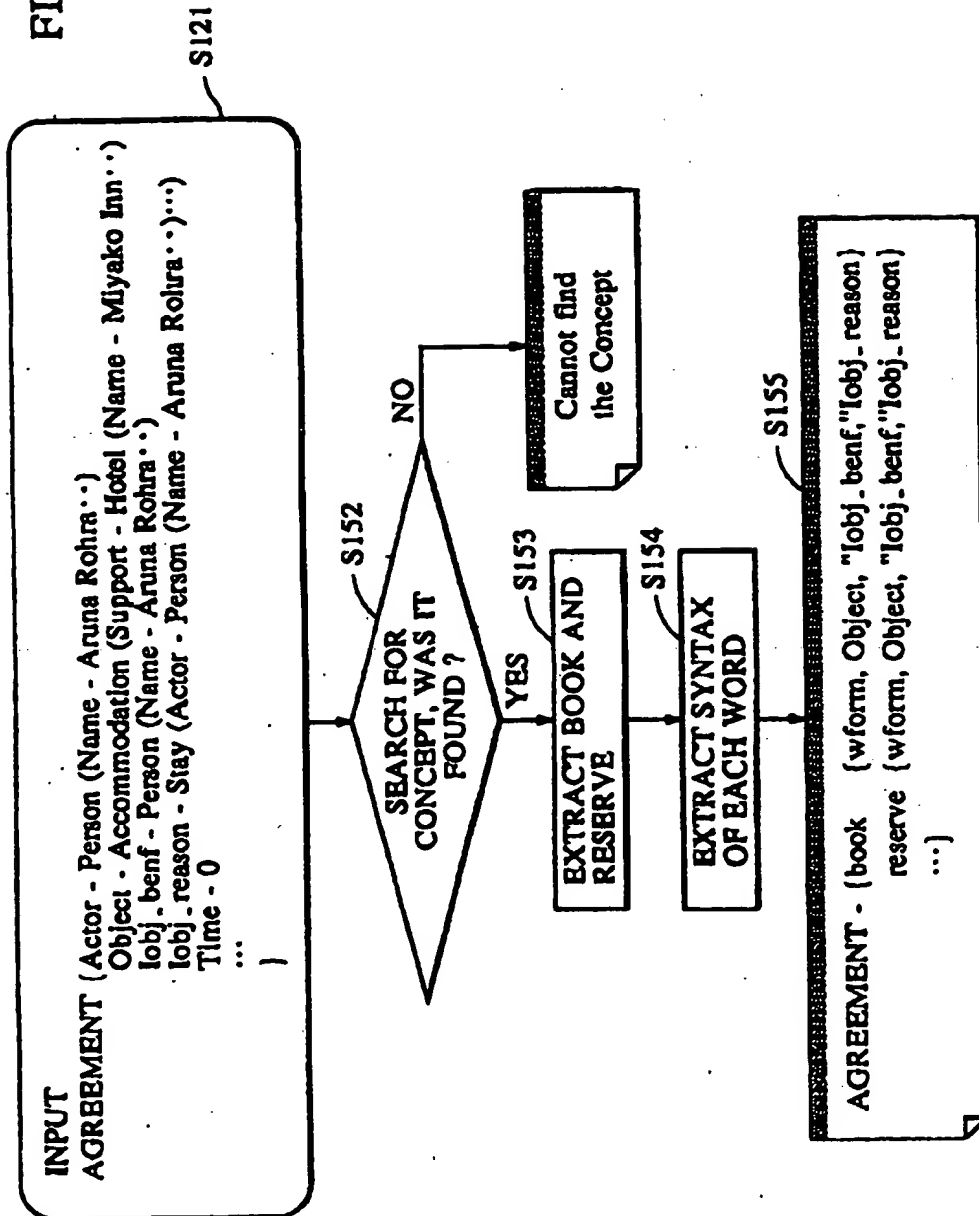


FIG. 65

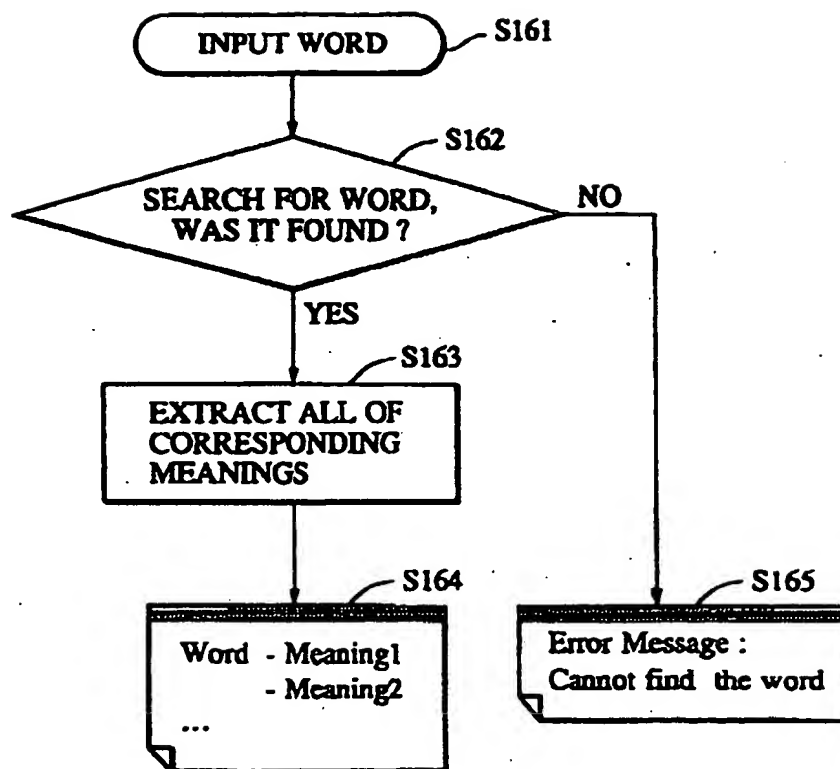


FIG. 66

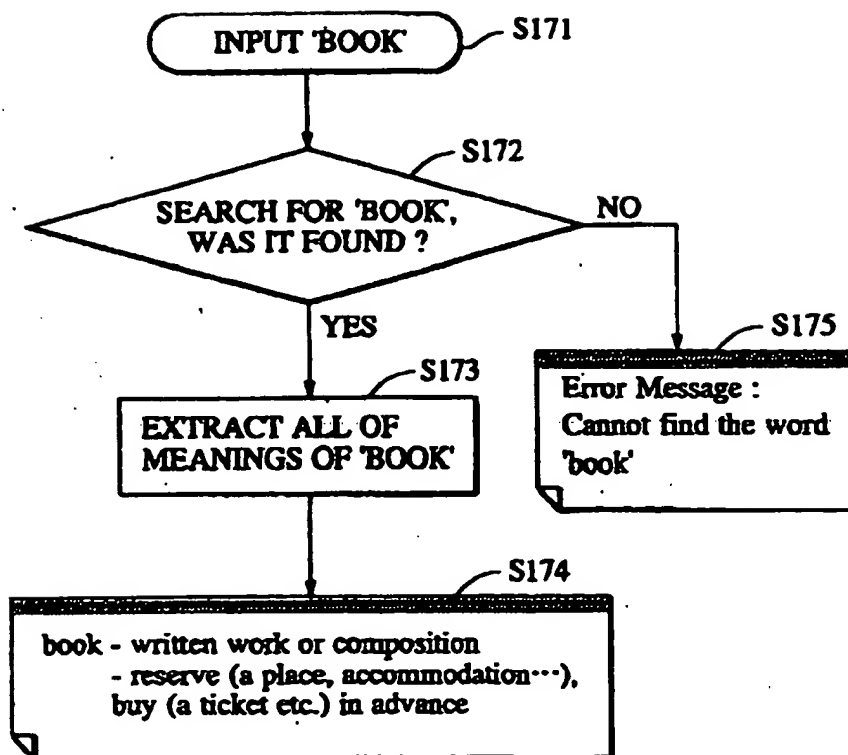


FIG. 67

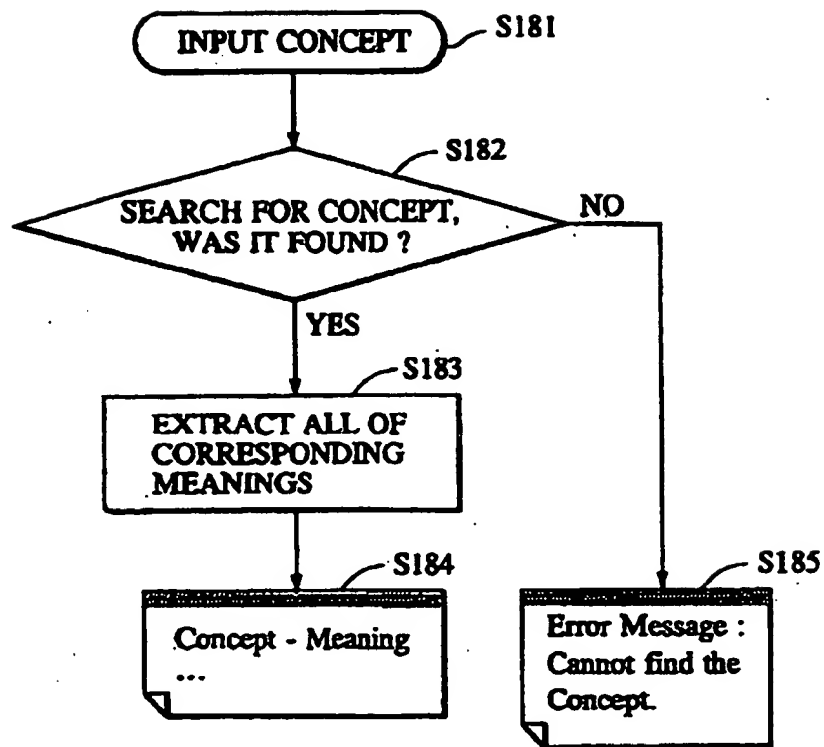


FIG. 68

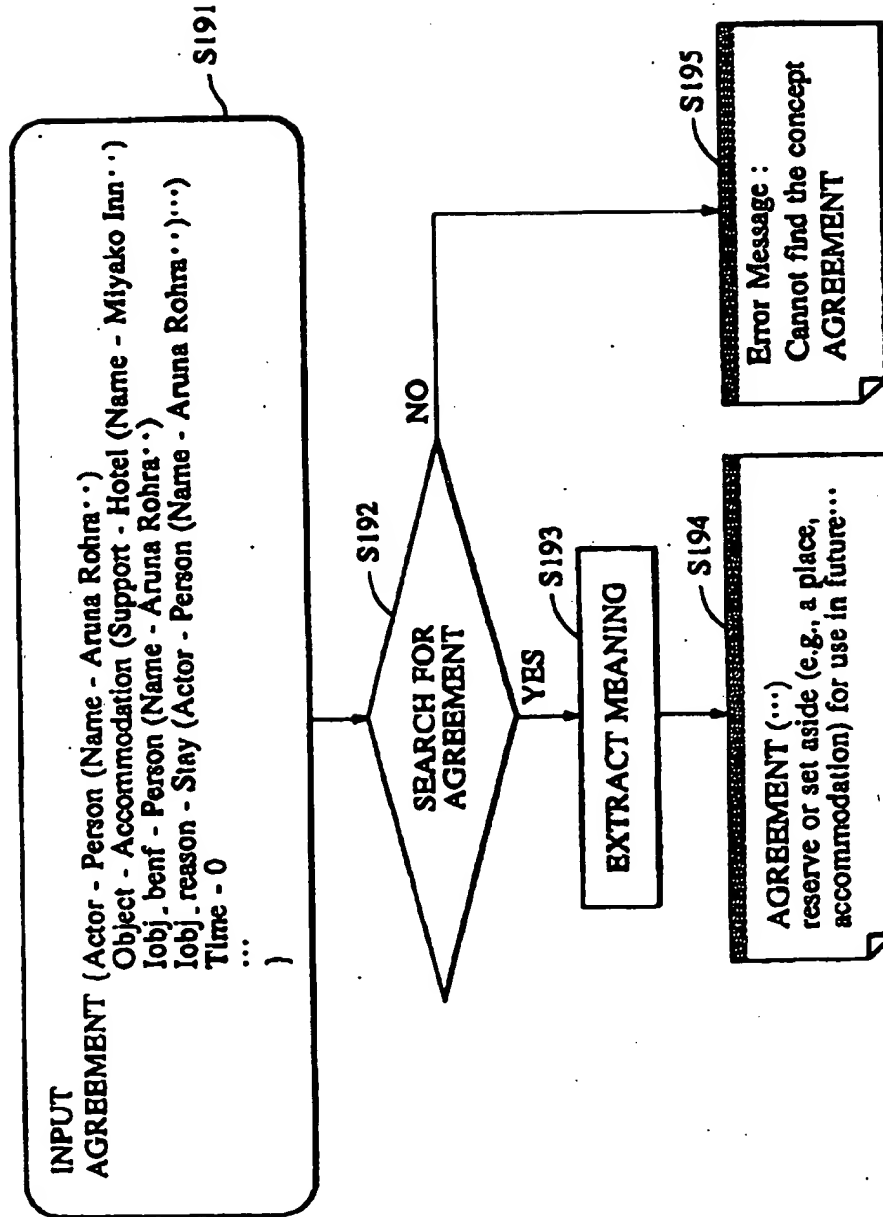


FIG. 69

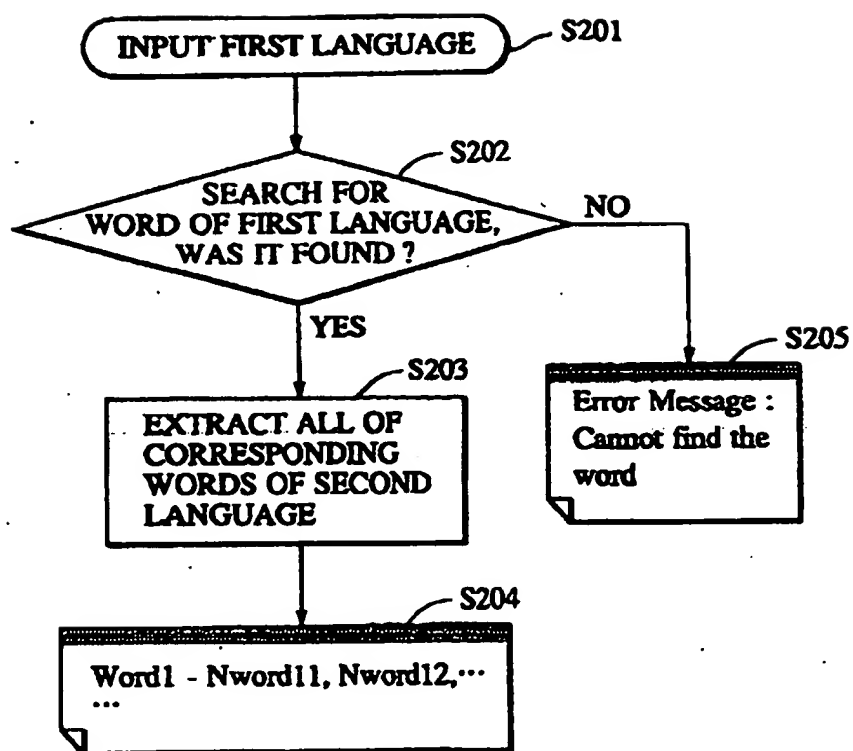


FIG. 70

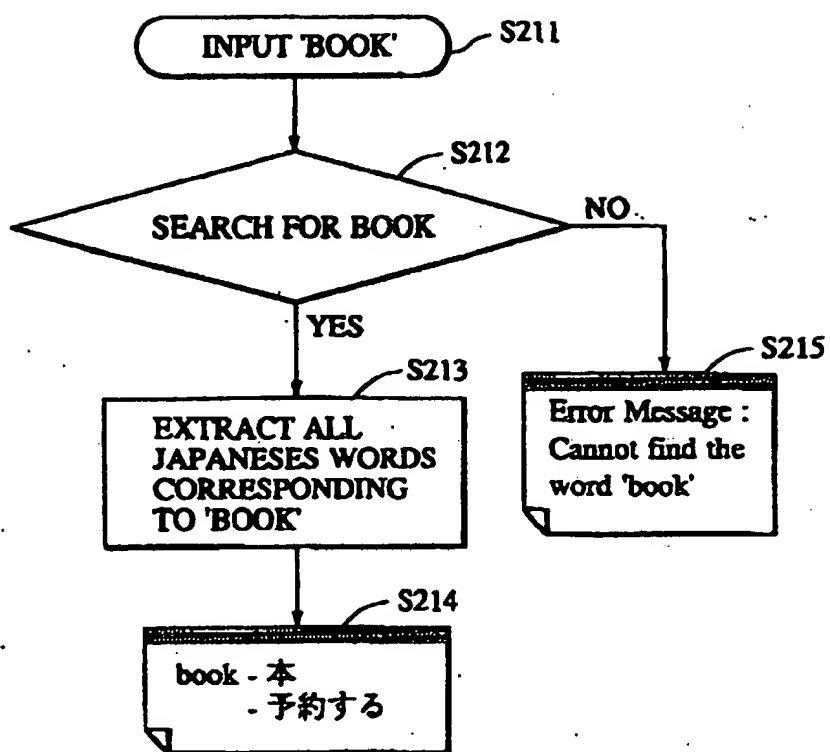


FIG. 71

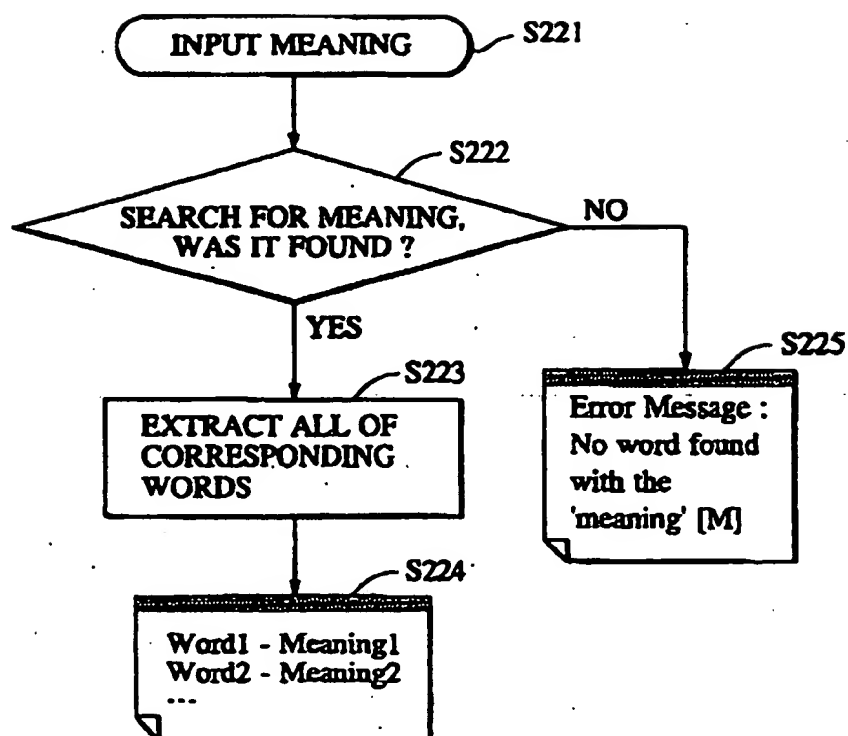




FIG. 72

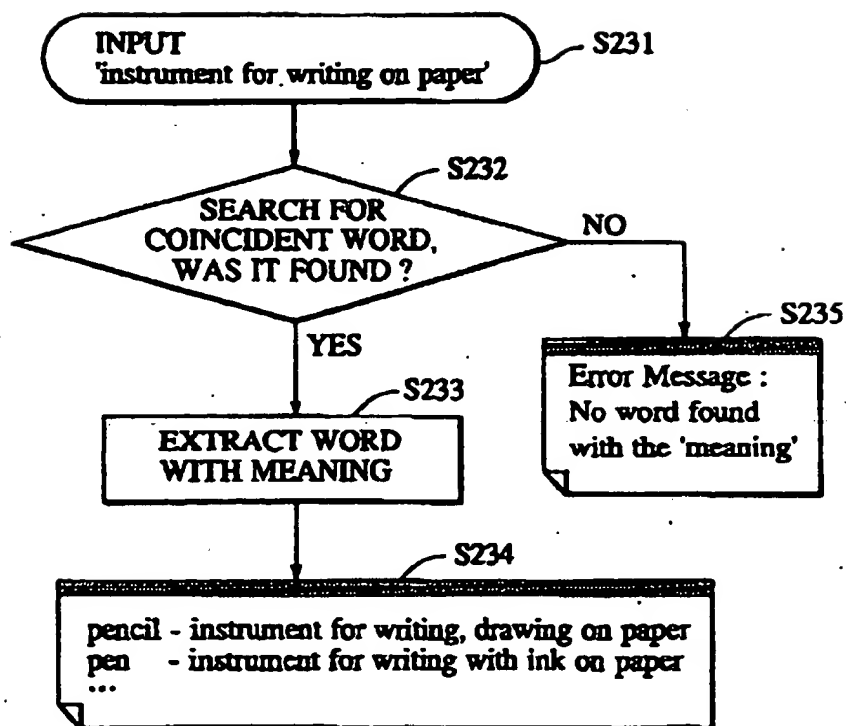


FIG. 73

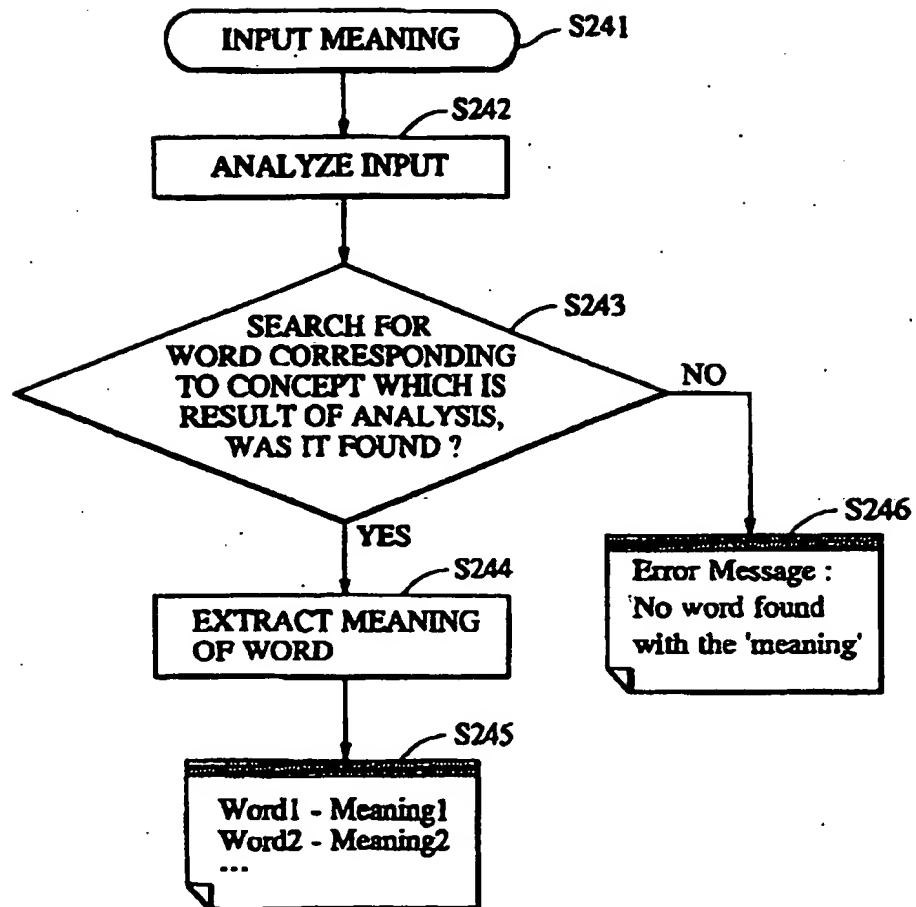


FIG. 74

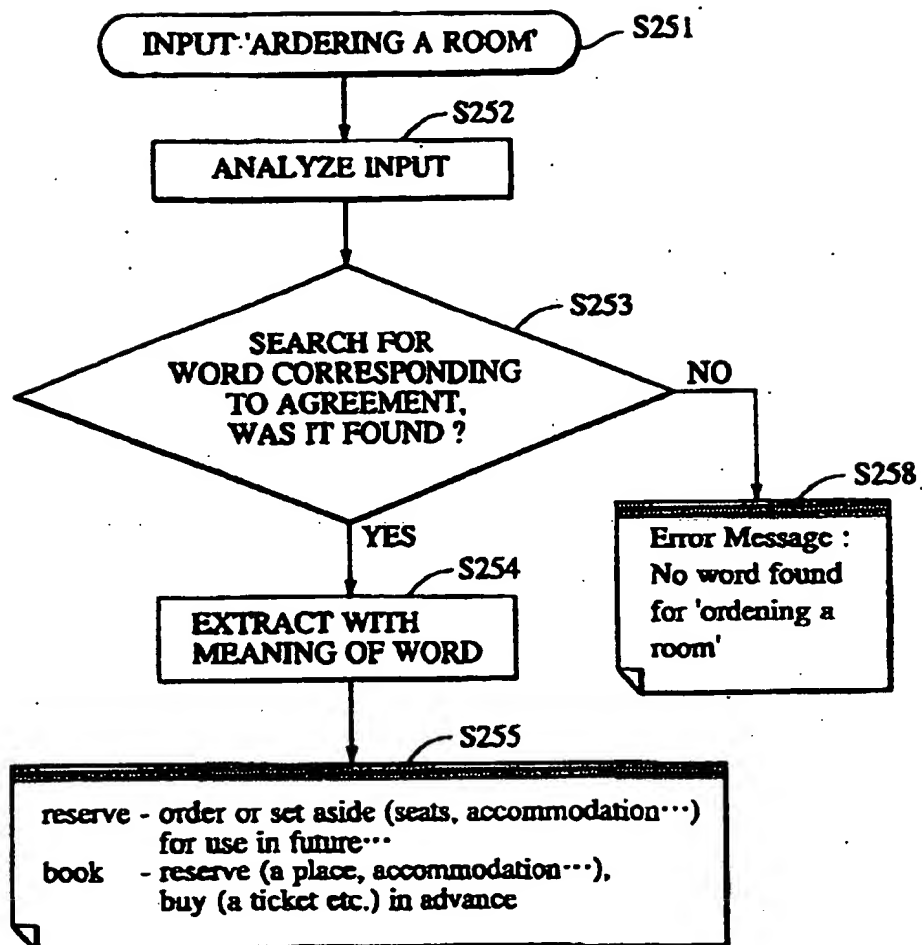


FIG. 75

John Smith	M	45 Rochester Univ.	Professor	...
John Williams	M	40 Columbia Univ.	Asst. Prof.	...
Boris Decker	M	42 ABC corporation	Manager	...
Mary Becker	F	35 Canon USA	Manager	...
...				

FIG. 76

## C1 MTRANS

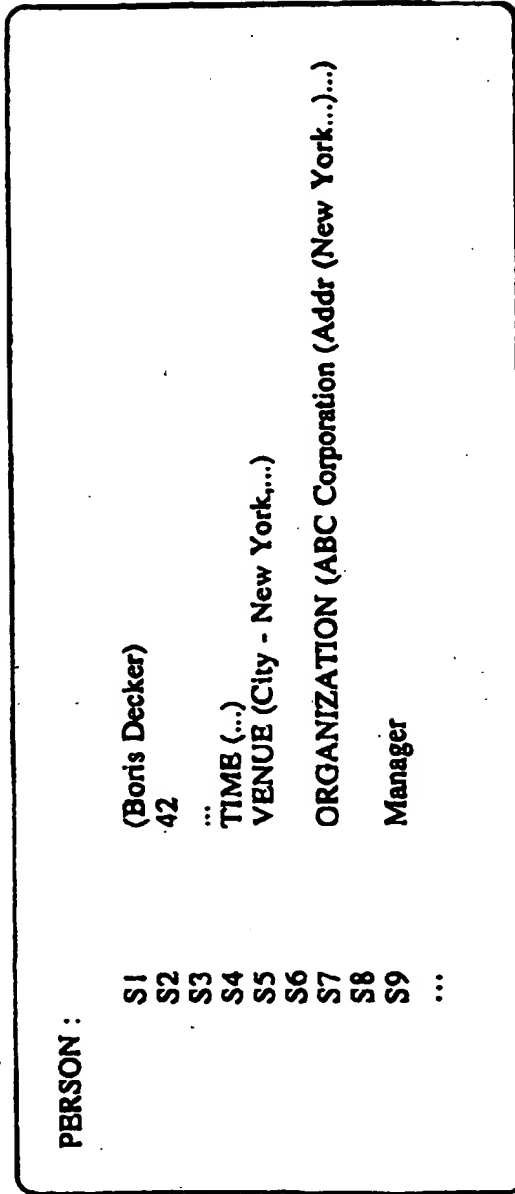
SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	LETTER (...)
Instrument	
lobject - Beneficiary	C2
- Reason	ACTION
- Direction	
- Via	
From	
Support	
Time	TIME
Connected To	
Tense	
Qualifier	

## C2 PERSON

PERSON :		
S1	(name - Boris)	
S2		
S3		
S4	TIME	
S5	VENUE.	
S6		
S7	ORGANIZATION (ABC Corporation)	
S8		
S9		
...		

FIG. 77

2



**FIG. 78**

**RECEIVER DETAILS**

**Letter To :**

<input type="text"/>	<input type="text"/>	<input type="text" value="Boris"/>
(first name)	(middle name)	(family name)

<input type="text" value="ABC Corporation"/>
(Organization)

<input type="text"/>
(Division)

FIG. 79

C3 MEET

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	C2
Instrument	
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	
- Via	
From	
Support	CS
Time	TIME
Connected To	
Tense	
Qualifier	

C4

PERSON :	
S1	(name - John Smith)
S2	
S3	
S4	TIME
S5	VENUE
S6	
S7	CS
S8	
S9	
...	

C5

ORGANIZATION :	
S1	(Duke University)
S2	ORGANIZATION
S3	ORGANIZATION
...	



FIG. 80

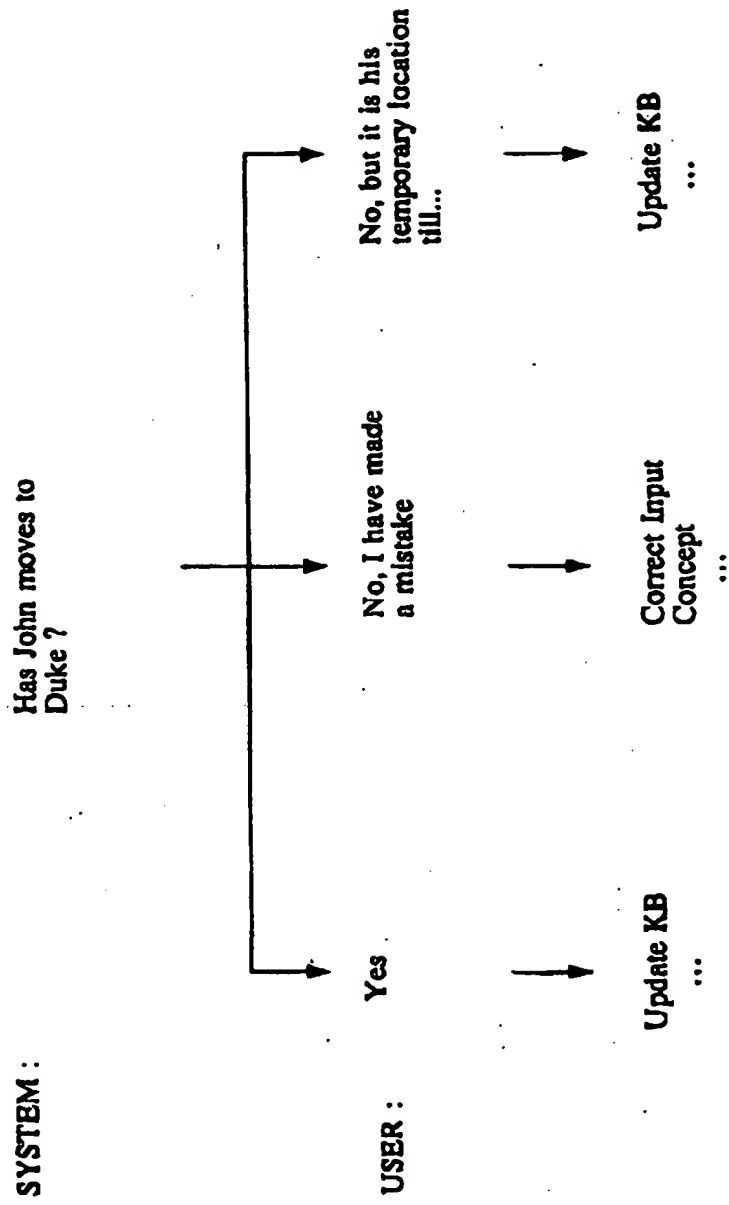


FIG. 81

C6 MEET

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	PERSON
Instrument	
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	
- Via	
From	
Support	PLACE / ORGANIZATION
Time	C7
Connected To	
Tense	
Qualifier	

C7

TIME :		
S1	<has Second>	
S2	<has Minute>	
S3	<has Hour>	
S4	<has Day>	10
S5	<has Day part>	
S6	<has Week>	
S7	<has Week part>	
S8	<has Month>	
S9	<has Month part>	
S10	<has Year>	
...		

FIG. 82

C7

TIME :	S1	< has Second >	
	S2	< has Minute >	
	S3	< has Hour >	
	S4	< has Day >	DAY (10)
	S5	< has Day part >	
	S6	< has Week >	
	S7	< has Week part >	
	S8	< has Month >	MONTH (5)
	S9	< has Month part >	
	S10	< has Year >	YEAR (1993)
	..		

FIG. 83

C8 MEET

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	C9
Instrument	
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	
- Via	
From	
Support	(C10 of PERSON (Boris))
Time	TIME
Connected To	
Tense	
Qualifier	

C9

PERSON :	
S1	(name - John Smith)
S2	
S3	
S4	TIME
S5	VENUE
S6	
S7	
S8	
S9	
...	

C10

ORGANIZATION :	
S1	( )
S2	ORGANIZATION
S3	ORGANIZATION
...	

FIG. 84

C8 MEET

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	C9
Instrument	
Iobjct - Beneficiary	PERSON
- Reason	ACTION
- Direction	
- Via	
From	
Support	(C10 of PERSON (Boris))
Time	TIME
Connected To	
Tense	
Qualifier	

C10

ORGANIZATION :	
S1	(ABC Corporation)
S2	ORGANIZATION
S3	ORGANIZATION
---	

FIG. 85

C11 MTRANS

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	C12
Instrument	
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	
- Via	
From	
Support	
Time	C13
Connected To	
Tense	
Qualifier	

C12

KNOWLEDGE DOMAIN :	
S1	NLP
S2	
S3	Artificial Intelligence
...	

C13

TIME	
S1	
...	
S12	(>Conference (Name - AAAI on - C12))
...	